ONTARIO PARKS

Quetico

Background Information

Ontario

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ONTARIO PARKS

July 18, 2007

Dear Sir/ Madam:

Ontario Parks is preparing a management plan for Quetico Provincial Park. As part of the planning process, I am pleased to present the **Quetico Background Information.** This document contains information about the park's natural and cultural features, recreation activities, market, and park users. Preliminary identification of issues is also summarized.

I invite you to review and comment on this document. All comments will become part of the public record for the duration of the planning process. Comments will be made available for public review upon request, unless privacy is requested, pursuant to the *Freedom of Information and Protection of Privacy Act*. If you require that your name not be made public, please indicate this in your response. Remarks or requests for additional information should be submitted to the attention of:

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Your comments will be carefully considered during the preparation of the Management Options document and the Preliminary Park Management Plan.

Yours truly,

Tim P. Sullivan
Manager
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Northwest Zone

EXECUTIVE SUMMARY OF BACKGROUND INFORMATION

Quetico Provincial Park, one of Ontario's largest and oldest parks, encompasses 469 456 hectares of rugged Canadian Shield with numerous lakes and streams. The park occupies a zone of transition between the boreal forests to the north, the mixed forests to the south and the Great Plains forests to the west and southwest. The park's abundant waterways, rich cultural history, wild undeveloped landscape and non-mechanized travel, all contribute to its reputation as an area of unparalleled wilderness canoeing opportunity.

Quetico lies due south of the Township of Atikokan, and is within a few hours drive of Thunder Bay and Fort Frances to the east and west. It is considered part of the traditional lands of the Lac La Croix First Nation (immediately adjacent to the western boundary of the park). Lac La Croix First Nation has many traditional use areas within and immediately adjacent to the park. The Seine River and Lac des Mille Lacs First Nations have historic ties to Quetico as well. Quetico Provincial Park lies within the Northwest Angle Treaty 3 area.

The southern boundary of the park is adjacent to the Boundary Waters Canoe Area Wilderness (BWCAW) within the Superior National Forest in Minnesota, and Voyageurs National Park lies alongside the international boundary to the west of Quetico. As well, the border waters of Quetico are also part of the Boundary Waters-Voyageur Canadian Heritage River system that extends from Lake Superior to Lac La Croix. These protected areas share many historical, natural heritage, and recreational interpretive themes with Quetico.

Quetico rests upon on the bedrock of the Canadian Shield, and its topography has been shaped by billions of years of erosion, including over two million years of advances and recessions by glaciers. Quetico is characterized by a rugged landscape of rock outcrops and a myriad of lakes. Quetico is situated just west of the 'height of land' continental divide in the headwaters of the Arctic watershed, and all of Quetico's waters drain to the west, ultimately into Hudson Bay.

Bedrock in approximately one-third of the park consists of softer, richer metasediments and greenstones. Thus, some Quetico soils (and consequently some lakes) are richer than those in Shield areas where bedrock is exclusively granite. The end result, in comparison to the granite area of Quetico, is a more productive ecosystem supporting larger numbers and greater diversity of plants and animals.

The flora and fauna of Quetico Provincial Park have developed following the recession of the last glacier and draining of glacial Lake Agassiz, which once covered much of the area. Glacier scouring deepened lake basins in some areas and left behind a thin layer of nutrient-poor sandy till over bedrock, resulting in low diversity of plants and animals in most of the park. Low-lying areas were flooded by meltwater and Lake Agassiz left deposits of fine-grained sediments in isolated pockets. These soils are higher in nutrients than those in the rest of the park, contributing to higher productivity and a greater diversity of species than is typically found in the rest of Quetico and the Canadian Shield.

Influenced by both the continental polar air mass and the continental dry air mass from the prairies, Quetico displays a diverse community of plants and wildlife. In addition, while Quetico is located within the Great Lakes-St. Lawrence Forest Region, it borders the Boreal forests to the north and the Great Plains forests to the west and southwest. As a result, Quetico contains a mixture of mostly northern, as well as some southern and western elements, resulting in a diversity of flora and fauna typical of the different regions, some of which are provincially rare or at their northern or southern limits of their range.

Natural disturbance is an important factor influencing the landscape of Quetico. Natural and human-caused disturbances such as fire, windstorms, and logging have had a large role in shaping the forests and landscape seen today. Fire, once the bane of park managers, has played a major role in maintaining the health of and perpetuating the park ecosystem.

The cultural heritage resources of Quetico are both

plentiful and significant, representing major expressions of the Aboriginal people of the boreal forest and Canadian Shield and their descendents, as well as Quetico's role and importance to the fur trade period and the exploration of Canada. Geographically, Quetico lies between Lake Superior and Lake Winnipeg, a strategic location during the European exploration and settlement of Canada, which straddled traditional water routes established by the earliest inhabitants.

Quetico's rich archaeological past can be traced to its origins as part of the corridor between glacial lakes Agassiz and Minong through which the earliest inhabitants moved northeast as the glaciers retreated and the number of archaeological sites found within the park reflects a high level of prehistoric occupation.

The boundary waters of Quetico have been a major transportation route since the earliest times. These routes were very important in the fur trade route of the voyageurs, where trade goods and furs were carried between the Canadian northwest and Montreal. Quetico also contains a section of the Dawson Route used by early settlers to move west from eastern Canada. The co-operation and partnership among the fur traders, the voyageurs, and Aboriginal people was a critical stage in the development of present day Canada, and international co-operation has been integral to the development and preservation of this extraordinary region.

Quetico offers a variety of recreation opportunities, in an array of natural settings. Recreational activities in Quetico have been limited to primitive forms of travel, as well as those activities that are associated and compatible with primitive travel consistent within the historical context of the park. Quetico Provincial Park provides both interior (backcountry) wilderness and campground-based opportunities for visitors. The Dawson Trail Campground at French Lake provides a 'window on the wilderness' to those not able nor inclined to venture into the interior. Quetico's high quality wildlife viewing and angling opportunities contribute significantly to the wilderness experience of many visitors.

The reputation of Quetico Provincial Park is based upon its outstanding wilderness canoeing opportunities, and Quetico is considered primarily to be the domain of the canoeist. The park's erratic drainage system provides countless interconnecting lakes and streams from which the canoeist can choose a route suitable to individual preferences and abilities.

Quetico's role as a protected area has evolved over the years, from a Forest and Game Reserve established in 1909, to its present state as a wilderness park - '*a wilderness sanctum of international acclaim*'. As a result, Quetico has had a varied and interesting history of land use, including logging, mineral claim staking, commercial fishing, and trapping. Today, most of Quetico is regulated Crown land, and provides economic benefits and opportunities to local communities and residents, and tourism outfitters. Quetico is renowned for its world-class wilderness canoeing opportunities, as well as its significant natural, cultural, and recreational resources.

The park planning process provides the overall framework for the protection and management of resources, visitor use, and overall development within the park. It is a dynamic process, looking forward to guide the park's management over the next 20 years. The planning process will incorporate full public consultation, and will include the following stages: terms of reference and invitation to participate, background information, management options, preliminary management plan, and approved management plan. The release of the management plan will also coincide with the 100th anniversaries of both Quetico and Superior National Forest in Minnesota, significant milestones in the history and protection of the international Quetico-Superior region. Since their establishment, both Quetico and Superior have contributed to the evolution of ideas and policies of wilderness management.

This background information document summarizes resource information about the area that has been collected over a number of years. It will serve as a foundation for the evaluation of issues and options, and will form part of the preliminary and approved management plans for Quetico Provincial Park.

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1.0 INTRODUCTION

1.1 The Purpose of a Park Management Plan

Ontario Parks prepares management plans for individual provincial parks to outline how it will protect, develop, manage, and operate those parks. Management plans show how individual parks will contribute to achieving the objectives of the provincial parks system. They also set out policies that will maintain or enhance that contribution over a 20 year period.

A management plan is reviewed or amended as needed to ensure the continuing relevance of the existing information, and to provide the flexibility to accommodate changes required by new circumstances affecting the park.

The park management plan identifies the contributions that an individual park makes to the achievement of the four park system objectives (protection, heritage appreciation, recreation and tourism). No plan is undertaken with a "blank slate". There are a variety of givens – management policies that apply to the entire park system, dealing with topics like park classification, zoning, or permitted uses. Conversely, the plan will also contain policies that reflect specific resources and management needs of the park.

In 2004, the community of Atikokan expressed a strong interest in the policies and operations of Quetico, and asked the Minister of Natural Resources to consider eleven recommendations regarding Atikokan and Quetico Provincial Park (Appendix I). In October 2004, The Minister committed to a Quetico Provincial Park Management Plan Review at a public meeting.

Quetico Provincial Park and its closely associated American counterpart, Superior National Forest (Boundary Waters Canoe Area Wilderness), will celebrate their 100th anniversaries in 2009. The new management plan will set direction for the future management for Quetico, to ensure the continuation of its role as one of the premier wilderness protected areas in North America.

1.2 The Plan Review Process

Plan reviews are undertaken to ensure the continued relevance of the content of the current plan. Reviews entail the re-assessment of all aspects of the original plan including objectives, zoning, resource stewardship, development and operations. A park management plan review requires comprehensive planning and public consultation. Methods of consultation include advisory groups, open houses, Environmental Bill of Rights (EBR) postings and direct notices to interested and affected parties. This also includes consultation with and participation by locally affected First Nations. The park management plan review will include, but not be limited to, consideration of:

- Zoning (e.g. creation of nature reserve zones, new access zones);
- Policies for resource stewardship, operations and development for:
  - Natural Resources
    - Wildlife management
    - Research (e.g. wildlife, natural fire, fisheries)
    - Vegetation Management
  - Cultural Heritage
    - First Nation values (e.g. spiritual sites, pictographs)
    - Historical sites (e.g. Cabin 16, King Point)
  - Operations
    - Natural Heritage Education (e.g. interpretation, information services)
    - Recreation management (e.g.. carrying capacity and quotas, new recreation activities, shoulder season and winter uses)
    - Atikokan-Quetico tourism recommendations
    - Tourism services (e.g. outfitting,)
    - Marketing (e.g. partnerships, relationship with Atikokan, Lac La Croix, Thunder Bay)
  - Development
    - Economic development (e.g. Lac la Croix and Atikokan)
    - New access points (e.g. locations, facility requirements)
    - New roads (e.g. Batchewaung Lake)
    - Other (e.g. backcountry hiking / ski trails)
- Implementation priorities for stewardship, operations and development policies
- Social and economic impact analysis (e.g. job creation, infrastructure)

Management planning discussions will recognize existing Aboriginal uses, and the aspirations of the Lac La Croix First Nation to achieve economic and employment opportunities associated with the park. Direction for management planning is provided in the Agreement of Co-existence (1994) with Lac La Croix First Nation (Appendix II).

In conjunction with opportunities for public involvement in the planning process, notices will be posted on the EBR Electronic Registry for 45 days for each phase of planning. Significant milestones in the schedule for the review process are:

Opportunity to Review the Background Information	2007
Opportunity to Review Management Options	2008
Opportunity to Review the Preliminary Management Plan	2009
Opportunity to Inspect the Approved Management Plan	2009

We invite everyone with an interest in the future of Quetico Provincial Park to get involved in the plan review process.

1.3 Ecological Integrity

The Ontario Government has introduced new legislation to ensure the permanent protection of provincial parks and conservation reserves. The new *Provincial Parks and Conservation Reserves Act* received first reading on October 25, 2005, and proclamation is expected in 2007. When legislated, the Act will repeal the *Provincial Parks Act* and the *Wilderness Areas Act*, and will make complementary amendments to other acts.

The following excerpts from the draft legislation deal with ecological integrity, and will have a significant impact on the management planning of the park:

Planning and management principles

s. 3. The following principles shall guide all aspects of the planning and management of Ontario's system of provincial parks and conservation reserves:

1. Maintenance of ecological integrity shall be the first priority and the restoration of ecological integrity shall be considered.

2. Opportunities for consultation shall be provided.

Ecological integrity

s. 5. (2) Ecological integrity refers to a condition in which biotic and abiotic components of ecosystems and the composition and abundance of native species and biological communities are characteristic of their natural regions and rates of change and ecosystem processes are unimpeded.

Same

(3) For the purpose of subsection (2), ecological integrity includes, but is not limited to,

a. Healthy and viable populations of native species, including species at risk, and maintenance of the habitat on which the species depend; and

b. Levels of air and water quality consistent with protection of biodiversity and recreational enjoyment.

2.0 REGIONAL CONTEXT

2.1 Introduction

***Wilderness parks** are substantial areas where the forces of nature are permitted to function freely and where visitors travel by non-mechanized means and experience expansive solitude, challenge and personal integration with nature.*

> *Provincial Parks and Conservation Reserves Act (Royal Assent received on June 20, 2006 and proclamation pending)*

Today, wilderness parks have significant value as relatively undisturbed large examples of the province's natural heritage. The preservation of these areas is important to the perpetuation and natural evolution of plant and animal species and ecosystems in Ontario, and it is also valuable for recreation, education and research. These areas can support and retain a diversity of plant and animal species, including moose and wolves, which require large ranges to survive. Environmental protection is of paramount importance; visitor activity is normally

confined to low-impact forms of recreation. Wilderness parks provide opportunities for exceptional recreational experiences with challenge, solitude and total immersion into our natural and/or cultural heritage.

> *"If it weren't for rapids, falls, and their accompanying portages, there would be no wilderness, no place to hear the cry of the loon. Let's keep our portages wild, the wilder the better." Bill Mason, Canoescapes*

Quetico Provincial Park encompasses 4758 sq km (475 782 hectares) of rugged Canadian Shield with numerous lakes and streams (Figure 16). The park occupies a zone of transition between the boreal forests to the north, the mixed forests to the south and the Great Plains forests to the west and southwest. The park's abundant waterways, rich cultural history, wild undeveloped landscape and relative lack of mechanized travel, all contribute to its reputation as an area of unparalleled wilderness canoeing opportunity.

Summary of Regulatory and Planning Milestones in Quetico

1909- Superior National Forest (SNF) in Minnesota and Quetico Forest and Game Reserve in Ontario are created on each side of the international boundary.

1913 – Quetico becomes a provincial park.

1926 - The 'roadless' area in SNF adjacent to the international boundary is set aside for recreation and the preservation of the area's scenic values.

1928 – Ernest Oberholtzer forms the Quetico-Superior Council and calls for protection of the entire Rainy River watershed by establishing an international wilderness area.

1934 –The International Joint Commission (IJC) rules against E.W. Backus' plans to dam the boundary waters for hydroelectric development.

1949 – The Canadian Quetico-Superior Committee is formed, dedicated to the protection of wilderness values.

1965 – U.S. Burton-Vento Bill sets out the BWCA as a wilderness area (BWCAW).

1967 – Quetico is classified as a Natural Environment park for education and recreation, and managed under a multiple-use policy.

1970 – The Quetico Advisory Committee is appointed in Ontario to study the conflict over logging in the park.

1971 – The Premier of Ontario announces a moratorium on logging in Quetico.

1973 – The Minister of Natural Resources accepts the recommendations of the Advisory Committee and announces Quetico's reclassification as a primitive park.

1975 – Voyageurs National Park in Minnesota established to preserve the exceptional scenery, geology, and waterway system which formed a part of the historic route of the voyageurs.

1977 - Quetico's first Master Plan is completed, which includes a plan to phase out all forms of mechanical transportation, and a recreation management plan to protect the environment and maintain the quality of the visitor's wilderness experience.

1978 – Quetico is regulated as a wilderness class park.

1982- After the first review of the Master Plan, Quetico's Revised Park Policy 1982 is released.

1989- After the second review of the Master Plan, Quetico's Revised Park Policy 1989 is released

1994 – Agreement of Co-existence signed between Lac La Croix First Nation and the Government of Ontario. Leads to the creation of a mechanized

guiding zone (Wilderness Zone 2) for Lac La Croix guides, a year-round road to Lac La Croix, and the co-management of W2, among other provisions.

1995 – Revised Park Policy 1995 released with strong input from LLC as a result of the Agreement of Coexistence.

1996 – Canadian Heritage River designation for the Boundary Waters- Voyageurs Waterway along the international boundary waters from Lake Superior through Pigeon River and La Verendrye Provincial Parks, and through Quetico to Bottle Portage. This gives national recognition and protection to an important example of Canada's natural and cultural heritage.

In spring 2006, the Quetico Provincial Park Management Plan Review was initiated, and is expected to be completed by 2009, the 100th anniversary of both Quetico and its closely associated U.S. counterpart, Superior National Forest (Boundary Waters Canoe Area Wilderness).

2.2 Surrounding Population Centres

Quetico Provincial Park is situated in northwestern Ontario between Thunder Bay and Fort Frances and is adjacent to the Township of Atikokan and the Lac La Croix First Nation (Figure 17). Quetico lies in the judicial District of Rainy River and the Fort Frances District of the Ontario Ministry of Natural Resources, and is within the boundaries of lands covered by Treaty 3. The park is within a two hour drive of Thunder Bay and Fort Frances, and a one day drive of many major population centres including Winnipeg, Manitoba and Minneapolis, Minnesota, U.S.A. There are no permanent residences or communities within the park's boundary.

The Township of Atikokan is located immediately north of Quetico, has a population of 3 293 (2006) and is the location of the park's headquarters. The Neguagon Lake No. 25D Reserve (Lac La Croix First Nation) abuts the southwest boundary of the park, where it spans 62.1 sq km along the northern shore of Lac La Croix (INAC 2006). This community of 271 (on reserve, 394 members total) is home to the Lac La Croix First Nation, and serves as a western administrative area for Quetico (INAC 2006).

Thunder Bay is the largest urban centre in Northwestern Ontario, with a population of 109 140 (2006). The city is 160 km east of Quetico (Dawson Trail Campground) and 210 km from the park headquarters in Atikokan. Thunder Bay lies at the Canadian Lakehead on Lake Superior and is strategically situated at the geographical centre (east-west) of Canada.

Table 1: Profiles of Select Communities 2001 and 2006 Canada Census

	Atikokan	Lac la Croix First Nation	Thunder Bay	Ontario
Pop'n. 2001	3 632	207	109 016	11 410 046
Pop'n. 2006	3 293	257	109 140	12 160 282
01-06 % change	-9.3	24.2	0.1	6.6
Unempl. Rate % 2001	11.9	n/a	8.8	6.10%
% Labour Force Particip. Rate 2001	62	n/a	63.1	67.30%
$ Indiv. 2001	n/a	n/a	31 359	35 185
$ family 2001	53 681	n/a	58 637	61 024
$ lone parent 2001	24 853	n/a	30 291	33 724

The city of Winnipeg (population 633 451 in 2006) is the closest out-of-province Canadian city, while Duluth (population 86 918 in 2000), Minneapolis (382 618 in 2000) and St. Paul (287 151 in 2000) are the closest American cities. Ely, Crane Lake, and Grand Marais, Minnesota are closely linked to Quetico through tourism, serving as starting points for many American visitors to Quetico. These communities are located to the south and southwest of Quetico and Boundary Waters Canoe Area Wilderness (BWCAW).

2.3 Access and Transportation Routes

Geographically, Quetico lies between Lake Superior and Lake Winnipeg, a strategic location during the European exploration and development of Canada, which straddled traditional water routes established by Aboriginal people. The boundary waters of Quetico were very important in the fur trade route of the voyageurs, where trade goods and furs were

carried between the Canadian northwest and Montreal.

Today, park visitors access Quetico through a series of entry points spread along the park boundary. These are controlled by a daily quota. The northern entry points and Lac La Croix are road accessible from Trans Canada Highway 11, and the Flanders forest access road, while the remaining entry points in the south are accessible only by water. Trans Canada Highway 11 is the lesser used highway in the northwest region, heading west from the Trans Canada Highway 17 at Shabaqua (northwest of Thunder Bay) all the way to Rainy River and the border crossing into the U.S. Trans Canada Highway 17 travels west through Kenora to Manitoba, and travels east from Thunder Bay to Sudbury and Toronto. Highway 11 serves many communities, including Atikokan and Fort Frances and lesser highways and logging roads provide access to several First Nations and small communities. Highway 11 is also connected to Highway 17 near Atikokan via Highway 622, which runs northwest to meet between Dryden and Ignace.

The location of Quetico on the Canada-U.S. border, adjacent to the Boundary Waters Canoe Area Wilderness of the Superior National Forest, leads to historically high usage by visitors of U.S. origin particularly in the south end of the park. For most of the park's history, southern entry point visitors comprised a large majority of entries to the park, while more recently southern entries have averaged about two-thirds of total entries. Similarly, non-resident use of the park has been historically dominant but in recent years the proportion of Canadian resident use has grown to an average of 25% of total use. In 2005 non-residents of Canada comprised 75% of Quetico visitors; 58% of entries were from the south side and 42% of entries were from the north side. The vast majority of these visitors enter Quetico through the Prairie Portage entry station. The Sand Point Lake area adjacent to Voyageurs National Park, MN, west of Quetico, serves as another access point for many American visitors to Quetico. Crane Lake, MN has a U.S. Customs office, and the Canada Customs office is located on the east shore of Sand Point Lake, at the end of the Dawson Portage, serving as the entry into Canada.

Mechanized travel for recreation is not permitted in the park. Motorboats were banned in 1979, with the exception of motorized guiding by members of the Lac La Croix First Nations Guides Association. Park aircraft are permitted to land at all entry stations and commercial aircraft are permitted to land at Cache Bay (1 Canadian entry per day) and as of 2005 as a trial at King Point on Basswood Lake (2 entries per day). Trappers are permitted to use aircraft, snowmachines and ATVs (with limitations) to access their traplines during the trapping season.

2.4 Surrounding Land Use

Quetico Provincial Park forms part of the Rainy Lake watershed and lies north of the international boundary waters between Canada and the United States (Figure 17). The Canadian waters were designated by the Canadian federal and Ontario provincial governments as part of the Boundary Waters – Voyageur Waterway, a Canadian Heritage River, in 1996. The southern boundary of the park is contiguous with the Boundary Waters Canoe Area Wilderness (BWCAW) within the Superior National Forest, while Voyageurs National Park abuts the international boundary to the west of Quetico. This 1 000 000 ha suite of protected areas centre around the historical travel corridor along the boundary waters between Lake Superior and Lake of the Woods (Figure 17), and have many historical, natural heritage, and recreational interpretive themes in common with Quetico.

Turtle River-White Otter Lake Provincial Park lies north of Quetico and to the east, south, and west are several parks that form part of the boundary waters fur trade route. These include La Verendrye Provincial Park and Pigeon River Provincial Park to the east, the BWCAW to the south, and Voyageurs National Park to the west of Quetico. A second historical travel corridor, the Kaministiquia route, also traverses the park. Important parks and reserves associated with this route include Silver Falls Provincial Park, Kakabeka Falls Provincial Park, and Fort William Historical Park (a Ministry of Tourism attraction.

Quetico Provincial Park is surrounded primarily by Crown land to the west, north, and east, and by the BWCAW in the south (Figure 18). The major economic activities in the area are forest management and tourism. Quetico abuts four Forest Management Units. The Dog River – Matawin Forest abuts the park on the east, as does a small portion of the Lakehead Forest; the Crossroute Forest abuts the park to the northwest and the Sapawe Forest abuts the park to the northeast. See Figure 19 for satellite image of recent harvest blocks adjacent to Quetico.

Ontario Parks staff participate in the forest management planning process (FMP) to ensure that there is regard for park values in forestry operations adjacent to the park boundaries. Areas of Concern (AOC) are identified and incorporated into the Forest Management Plans to protect water quality, nesting sites, and other sensitive areas, as well as park visitor's wilderness experience. This is accomplished through timing restrictions, which may prohibit or restrict the amount and type of forestry activities that may occur in or near the AOC during a specified period of time; decommissioning of forestry roads that might provide unauthorized access to the park; through use of mitigation measures during road construction to avoid water quality impairment near riparian zones; and through numerous other methods.

There are many permanent residences, cabins, and commercial establishments, including resorts and outposts in the surrounding area, in addition to the Town of Atikokan and Lac La Croix First Nation (Figure 18). Highway 11 runs east-west to the north of the park, and in some places serves as the park boundary. Other surrounding land uses include commercial trapping, commercial bait fish harvesting, mineral exploration, and hydro-electric power generation. In the area adjacent to the east boundary of the park mining claims continue to be staked and mineral exploration and development is ongoing. Exploration is focusing on gold deposits as well as volcanogenic massive sulphide deposits of primarily copper and zinc. Approximately 20 km to the north of the park Ontario Power Generation operates a coal-fired hydro-electric power plant. There is a proposal for hydro-electric development on the Namakan River to the immediate west of Quetico.

3.0 LAND TENURE, USE, AND DEVELOPMENT

Quetico has a varied history of land use, including logging, mineral claim staking, and commercial fishing. Today, most of Quetico remains regulated land, with a few exceptions. Less than 0.02 % of the area of Quetico is private land.[1]

Hunter Island, a 2 330 sq km (233 000 ha) portion of the park surrounded by inter-connected waterways, was set aside exclusively for recreational purposes in 1943. Subsequently, no commercial resource harvesting activities (e.g. commercial fur harvest, timber harvest) have occurred in this area since then.

There is a concrete dam on Sucker Lake at Prairie Portage which is maintained by U.S. authorities (Figure 18), in addition to several other dams in the interior, described later. A hydro-electric transmission corridor issued under a Land Use Permit (LUP) was built in 1968 by Ontario Hydro and is located inside the northeast section of the park running south of the Highway 11 corridor (Figure 18).

Although there are no commercial tourism operations (with the exception of one outpost cabin on Batchewaung Lake) based within the park, Quetico is used by dozens of Canadian and American-based commercial canoe outfitters each year.

3.1 Park Land Tenure

3.1.1 Historic and Contemporary Mineral Exploration

The area presently incorporated within Quetico's boundaries was subject to searches for marketable minerals in the period before its regulation as a provincial park. Prospecting for iron, gold and other minerals occurred primarily in the southeastern sector of the park with a number of patented claims being established. With regulation as a provincial park in 1913, all prospecting and claim-staking

[1] The private land referred to here is mostly mining patents.

activities were prohibited. However, this ban was lifted in 1939 as an emergency measure associated with the war effort in a cross-Canada staking blitz for uranium and other strategic minerals. Exploration was not again restricted until August 27, 1956. Claims and licenses of occupation granted during this time were upheld, with some 37 patented mining claims and 64 mining Licenses of Occupation, accounting for approximately 2 250 ha established within the park. An acquisition program was initiated in 1968 to acquire all claims and licenses and return them to the Crown. To date more than 80 of these properties have been acquired or forfeited to the Crown. Four mining patent properties and one mining License of Occupation remain (Figure 18).

In the winter of 2005, Freewest Resources Canada Inc. announced a new base metal discovery in the Western Shebandowan Greenstone Belt, which is immediately adjacent to the eastern boundary of Quetico. The Sungold property has shown high assays for copper, zinc and other base metals. More than 4 000 additional hectares adjacent to the park's eastern boundary have been staked within the past few years.

3.1.2 Private Land

Quetico Provincial Park contains several patent land parcels, totalling 103.4 ha. These lands are not subject to the *Provincial Parks and Conservation Reserves Act* or Quetico Provincial Park regulations, and instead are under the authority of the *Planning Act*, and the *Mining Act*. Many are the result of mining claims staked during and after WWII. There are four remaining undeveloped mining patents, and a mining License of Occupation. Developments exist on three other patent land parcels: a private cabin each on Batchewaung and Saganagons lakes, and a commercial outpost cabin on Batchewaung Lake (Figure 18). In a unique acquisition agreement in 1984, a parcel of private land on Saganagons Lake was returned to the Crown and the park with the provision that the occupying family be given a lifetime lease for the use of the land.

A number of Restricted Area Orders (RAOs) under the authority of the Public Lands Act have been used over the years to control development of private land in Quetico. There are currently two RAOs in effect in Quetico, Ontario Regulations 876 and 474/91. These have been used to prevent the development of mining patents for purposes other than legitimate mining activities (i.e. not for cottage development), and to prevent further developments on private land within Quetico as a result of more private land falling within the park due to boundary adjustments.

3.2 Park Land Use

Quetico Provincial Park lies within the Treaty 3 area. It is considered part of the traditional lands primarily used by the Lac La Croix First Nation. It has also been used historically by the Lac des Mille Lacs and Seine River First Nations. Lac La Croix First Nation has many traditional use areas within and immediately adjacent to the park. Historically, the richness of the Quetico area provided for all of the needs of the original inhabitants; hunting and fishing are still important activities for local First Nation residents. These activities are conducted not as 'sport' or 'recreation', rather as an important supplement to their existence and a cultural tie to the land, and are a treaty right. The treaty right to hunt and fish for food and ceremonial purposes is protected under section 35 of the *Constitution Act, 1982*.

3.2.1 Commercial Fur Harvest

With the establishment of the Quetico Forest Reserve in 1909, commercial fur trapping was prohibited. This ban remained in effect until 1949 when representation was made by the Indian Affairs Branch of the Federal Government to the Ontario Department of Lands and Forests to re-open part of the park fur trapping. At this time, it was successfully argued that Quetico's fur resource could provide a much needed source of livelihood to members of the Lac La Croix First Nation. Initially, fifteen traplines were established in the northern and western sectors of the park. Trapping operations commenced on these lines in 1949. In 1951, the Lac La Croix First Nation made an application for additional traplines. At that time, about forty trappers were without lines while an abundance of beaver existed in the park. As a result, additional traplines were established in the park's northeastern sector.

Until 1977, there were 14 traplines (as a result of trapline consolidation) operated by Aboriginal or

Métis people in Quetico. Between 1977 and 1986 two non-native trappers acquired two traplines within the park. There are presently eighteen registered traplines wholly or partially within Quetico and of these, 13 are operated by members of the Lac La Croix First Nation. These lines are located in the park's northwestern, northern and northeastern sectors, as shown in Figure 20. Non-native trappers hold four traplines in Quetico as a result of trapline transfers and as a result of an adjustment in the park's northern boundary in 1977. Provincial park policy directs that those traplines not held by Status Indians exercising treaty rights will be phased out by January 1st, 2010. Trapline transfers may only occur to licenced members of Lac La Croix. Trapping is limited to the harvest of beaver and marten.

A number of traplines in the park are served by trapping cabins. Three trap cabins remain in use within the park, and are discretely situated away from shorelines and away from major canoe routes.

3.2.2 *Historic Commercial Fishing*

In the 1920s, a licensed commercial fishing venture was established on Pickerel Lake for lake trout, walleye and whitefish. The operation was short-lived, proving economically unfeasible. In 1959, a license permitting the harvest of lake sturgeon in Lac La Croix was granted to the members of the Lac La Croix First Nation; because of the low financial return, the license was not renewed after 1970. While this activity did not occur within the park, it is likely that that lake sturgeon would have migrated into Quetico rivers to spawn. A whitefish license was issued to the First Nation in 1960 but was not renewed after 1963. No commercial fishing occurs or is permitted in Quetico Provincial Park.

3.2.3 *Motorized Guiding*

The Lac La Croix First Nation (LLCFN) has a long-standing dependency on the fisheries resources of the QPP area. Tourist guiding activities within and adjacent to QPP are an important socio-economic activity for the LLCFN through the Lac La Croix Guides Association (LLCGA). A partial ban on motorized watercraft in 1975 allowed members of the LLCGA to conduct day-use motorized guiding using motors no more than 10 hp on eight lakes in Quetico. In 1995 an Agreement of Co-existence was signed between the Province of Ontario and the Lac La Croix First Nation. The Agreement provided for members of the LLCGA to use motors no more than 10 hp to continue guided services to anglers on a group of 21 lakes within Quetico Provincial Park (Figure 18), only 10 of which may be used in a given year, one of which may be designated as fly-in. This motorized guiding activity is anticipated to be phased out by 2015. Table 2 shows the lakes utilized for motorized guiding and the years they have been used.

Table 2: Use of Motorized Guiding Lakes in Wilderness Zone 2

Lake	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Beaverhouse	X	X	X	X	X	X	X	X	X	X
Quetico	X	X	X	X	X	X	X	X	X	X
Cirrus	X	X	X	X	X	X	X	X	X	X
Wolseley	X	X	X	X	X	X	X	X	X	X
Tanner	X	X	X	X	X	X	X	X	X	X
Minn	X	X	X	X	X	X	X	X	X	X
McAree	X	X	X	X	X	X	X	X	X	X
Argo	X	X	X	X	X					
Crooked	X					X	X	X		
Basswood	X	X	X	X	X					
Poohbah		X	X	X	X				X	X
Iron						X				
Badwater						X				
Roland							X	X	X	X
Middle Roland							X	X	X	X
Omemee										
Cub										
Bearpelt										
Bottle										
Wicksteed										
Darkwater										

3.2.4 *Historic Commercial Timber Harvest*

Logging activity began in Quetico over 100 years ago. In 1891, the first harvest licenses were issued on two timber berths[2] in the Beaverhouse-Quetico-Bearpelt lakes area. Extraction of red and white pine in Quetico began in the early part of the last century with licenses being issued to Shevlin Clark in 1906 and to J. A. Mathieu in 1910. Scaling records indicate that a total of 1.2 million cubic metres of white and red pine were harvested between 1918 and 1946 from the Quetico River, Bearpelt, and Maligne watersheds (Peruniak

[2] Historically, a timber berth was the cutting rights to an area or forest leased by a logging company from the Crown. After the timber was removed the land reverted back to the Crown. Today, this is comparable to the Sustainable Forest License (SFL) granted to forest companies in Ontario.

Loading Crew, Namakan River Area, 1924

Cutting operations ceased in 1946 because of the depletion of merchantable stands of red and white pine and did not resume until the winter of 1960-61. At this time, the Jim Mathieu Lumber Co. Ltd. was issued a license to commence operations on 1 060 sq km of area on Crown lands which included the northeastern sector of Quetico. Until the termination of commercial logging in the park in 1973, about 510 000 m^3 of jack pine, spruce, balsam and poplar were harvested in the license area. In the course of regeneration in the resultant 4 735 hectares of cutover, approximately 3 million tree seedlings were planted. The area is now dominated by mature jack pine stands.

The southern half of Quetico, known as Hunter Island, remained largely untouched by logging, due to its distance from transportation routes and its remote nature. However, some logging was conducted in several areas within Hunter Island in the first half of the 20th century. More than 106 000 m^3 of red pine, white pine, jack pine, and spruce saw logs were cut on Hunter Island from 1940-1943.

The logging roads that once crossed Quetico have largely grown in. Today, portions of the logging road system in the northwest corner remain, and have been maintained or cleared, to provide corridors for portages, trapline trails, hiking and ski trails.

3.3 Existing Park Development

Quetico Provincial Park provides both interior (backcountry) and campground-based opportunities for visitors.

Facility development, associated with both recreational use and the Ministry's management responsibility, tends to be distributed around the park's perimeter. Thus, the interior of the park remains largely free of human-made structures.

Facilities associated with access zones account for most development within Quetico. Currently, there are six entry stations, of which five are located on the southeastern, southern and western margins of the park (Figure 18). The two stations accessible only by water or air are Cache Bay (Saganaga Lake) and Prairie Portage (Basswood Lake). French Lake, Beaverhouse, and Lac La Croix entry stations are all accessible by road, and indirectly, Atikokan entry via Nym Lake or Lerome Lake into the park.

A typical entry station consists of an office-residence, and a warehouse or boathouse. Historic ranger cabins also remain on Basswood Lake at King Point, and Cabin 16 near Ottawa Island. Many more buildings have been dismantled or allowed to deteriorate, and today remnants can be seen on Tilly Lake (Cabin 26), Sturgeon Lake, Burntside Lake and Pickerel Lake (at Mosquito Point).

3.3.1 Quetico Interior

There are many historic buildings and structures found within the park. Old fire detection towers still stand in a few areas of the park, reminders of the days when men would spend a season in the towers, alone, scanning the horizon for fires. Fire towers remain at Beaverhouse Lake, behind the Ranger Station, as well as on a ridge above McKenzie Lake (Figure 18). An old fire tower on Kahshahpiwi Lake has been adapted as a repeater station to facilitate park radio communications in the south end of the park. It has played an important role over the years in visitor emergencies and it has become a point of interest as a result of its location on the park's most heavily used canoe route.

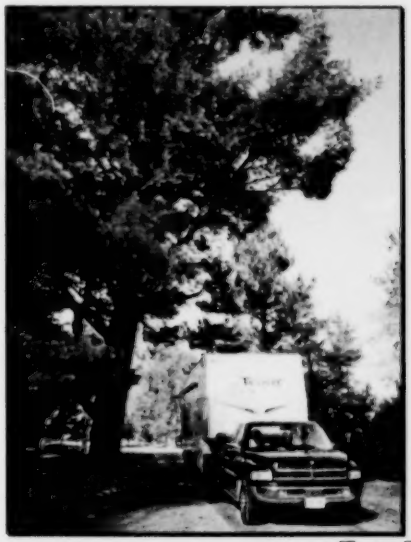
Fire Tower on Kahshapiwi Lake, 1950

There are many water-control structures in the park, most of which are remains of settlement and logging era dams and sluiceways. A concrete dam between Pickerel Lake and Bisk Lake still remains in use, and there are also remains of a dam at the far east end of Beaverhouse Lake (Figure 18). A wooden dam exists at the west end of Tanner Lake, built during the logging era, and it is being allowed to disintegrate. Remains of other logging dams can be seen throughout the park. A small hydroelectric system operates in a stream at Prairie Portage to power the station's administrative buildings.

3.3.2 Dawson Trail Campground

The Dawson Trail Campground was established in 1957 on French Lake, and provides a 'window on the wilderness' to those not able or inclined to venture into the interior. French Lake has several sand beaches, and has many opportunities for outdoor activities including fishing, canoeing up Baptism Creek or down the Pickerel River; hiking trails; and snowshoeing and cross-country skiing in the winter. The area is also ideal for nature appreciation, with boreal and mixed forest types nearby, beaver-created wetlands, and spectacular sunsets. Wildlife viewing is another option, with resident squirrels and jays, as well as the occasional moose or deer seen wandering down the beaches.

Facilities are provided for day-use, car-camping and interior access (Figure 21). There are 107 campsites, 49 of which have electricity and 2 which are barrier-free, as well as two yurts, comfort stations, and day use areas. Both Ojibway and Chippewa campgrounds have a comfort station with shower and laundromat facilities, drinking water taps, additional vault privies, and one barrier-free campsite each. Both campgrounds have a garbage disposal station. A trailer dumping and filling station is located near Chippewa. Interior access facilities include a parking area and a canoe-launching site at Ojibwa.



[T. van Dyk]

The day-use area has two sand beaches on French Lake: the Pickerel River day use area beach and the French Portage day use area beach near the Ranger Hall Nature Centre log cabin. A small building nearby has been renovated as an artist studio. The Pickerel River day use area features a playground and picnic shelter with outdoor grills, a large parking area, as well as washrooms and a changing area. The French Portage day use area is situated at the end of the historic French Portage from Windigoostigwan Lake, marked by a plaque at the trailhead, and includes the log cabin, fire pit and the Voyageur Canoe Launch, as well as year-round, barrier-free washrooms and parking area (Figure 21). Activities include swimming, fishing, picnicking, canoeing, and hiking on interpretive and hiking trails.

Dawson Trail has a number of winter facilities. The log cabin is used for occasional winter interpretive programs and events, and the nearby comfort station remains open for visitors. Hiking trails close to the campground are groomed in the winter for cross country skiing. There are two yurts available for winter use in the Chippewa Campground, with electric heat, bunk beds, barbeque, and fire pit. There is a canvas prospector tent on a platform equipped with a woodstove at the old Camp 111 near Baptism Creek. An outdoor privy is also located near the tent at Baptism Creek (Figure 21).

Numerous visitor service facilities complement the day-use and campground areas. These include the Teaching Place roundhouse, a multi-use activity centre for cultural and Natural Heritage Education programs; the Quetico Provincial Park Heritage and Information Pavilion (Figure 21). The pavilion houses the French Lake entry station, staff offices, the Friends of Quetico Park store, and the research library.

John B. Ridley Research Library

The Library was established by The Quetico Foundation in memory of John B. Ridley who was, for 21 years, the Chairman of the Foundation. The library is open to everyone with an interest in Quetico. It provides resources for the study of biology, geology, history, culture, archaeology, and wilderness management of Quetico and its environment. The collection, managed by the Park Librarian, includes books, articles, pamphlets, maps, slides, photographs, and oral history tapes.

3.4 Classification and Zoning

All provincial parks in Ontario fall into one of six classes: wilderness, nature reserve, historical, natural environment, waterway and recreation (Ontario Parks Planning and Management Policies 1992). Quetico is a wilderness class park.

Parks are divided into zones for resource management purposes. There are six different types of zones, although not all zone types are compatible with all classes of parks. All lands and waters within a park are zoned for their most appropriate use based upon the natural and cultural features, existing and potential recreation activities, as well as existing development and site conditions. Zoning recognizes that within a park there are different features that require different management strategies.

Quetico presently contains two types of zones: central wilderness zones and peripheral access zones (Figure 18). Nature reserve and historic zones may also occur in wilderness class parks.

3.4.1 Wilderness Zones

- Wilderness zone 1 (W1)
- Wilderness zone 2 (W2)

The two wilderness zones occupy all but approximately 250 ha[3] of the park and are the raison d'être of Quetico (Figure 18). W1 comprises the eastern side of the park, including most of Hunter Island. Mechanized travel is not permitted in W1. W2 was established as a result of the 1994 Lac La Croix amendment to accommodate the short term power boat and aircraft access to 21 designated lakes, for the purpose of guiding anglers, for the Lac La Croix Guide Association. W2 is also designated as an area that is co-managed with the Lac La Croix First Nation. The co-management regime includes restrictions on powered watercraft to 10 hp (7.5 kW), methods of compliance and enforcement, and the establishment of a process to work towards the eventual elimination of power boat and aircraft use within Quetico Provincial Park. Lac La Croix First Nation also maintains the portages within W2 and operates the Beaverhouse and Lac La Croix entry stations.

3.4.2 Access zones

French Lake/ Dawson Trail Campground

The French Lake access zone contains the Dawson Trail campgrounds, staff quarters and offices, the Heritage and Information pavilion and John B. Ridley Research Library, day use areas, the Teaching Place roundhouse, and interpretive, hiking and cross country ski trails (Figure 21).

The Stanton Bay forest access road, located outside of the park boundary north of Pickerel Lake, is an alternative entry for Pickerel Lake with a parking lot and a boardwalk portage to Stanton Bay. Overnight

[3] In the Quetico Provincial Park Revised Park Policy 1995 the access zone area is referred to on page 6 section 6.1: "The wilderness zones occupy all but about 250 ha of Quetico's approximately 475 819 ha."

parking at this location is restricted to Canadian citizens.

The exact boundary of the French Lake access zone was never defined. Maps included in the 1977 Master Plan are not consistent in the portrayal of the size of the French Lake access zone. Subsequent mapping for Revised Park Policies has carried this ambiguity forward. The total area of all the access zones in previous plans is referred to as being 250 ha in size, but the boundary marked on some park maps suggest a size substantially larger for the French Lake access zone (approximately 2000 ha or less than 0.04% of Quetico). This latter area has been digitally mapped and is currently used to define the access zone. This larger area encompasses the entirety of French lake and extends beyond the Dawson Trail campground to where the Pickerel River flows into Pickerel Lake, extends southeast beyond the French River, and to the north is defined by the park boundary and highway. A small section also exists north of the highway at the end of Windigoostigwan Lake to include the site of a way station on the historic Dawson Trail. This zone now provides a larger area for "threshold" wilderness experiences and hiking/ski trail development and mechanised trail grooming.

The interior entry stations are located within access zones, which have not been digitally mapped, thus their actual sizes and boundaries are not defined.

Cache Bay
Cache Bay access zone consists of two small islands on Saganaga Lake. One island contains the entry station with staff quarters, the entry station office, and a storage garage, an aircraft landing dock, and a solar powered composting privy for park visitors. The second island had a cabin for interior crews, which was removed in the early 1990s.

Prairie Portage
Prairie Portage access zone consists of a peninsula of land adjacent to the Canada - United States border between Basswood Lake and Sucker Lake. The entry station has staff quarters with the entry station office, an aircraft landing dock and a hydro-electric powered composting privy for park visitors. A cabin for interior crews was removed in the late 1990s. The Canada Customs facility ceased operation in 1996 and Ontario Parks has since used the buildings to operate a park's store and to provide accommodations for entry station staff and interior crews. Upgrades to these facilities are planned for 2006-2008.

Beaverhouse
Beaverhouse access zone consists of two parcels of land; one at the end of the Beaverhouse access road with a small parking area and portage to Beaverhouse Lake and the other across the lake on the shore of a small bay. This second parcel contains the entry station facilities which include staff quarters with the entry station office, an aircraft landing dock and a small cabin for interior crews. The Beaverhouse entry station is operated and staffed by Lac La Croix First Nation.

Lac La Croix
The Lac La Croix access zone is located on a peninsula on the southeast shore of Lac La Croix. This entry station ceased to operate after the 1997 season when the entry station was relocated near the village of Lac La Croix, where it is now operated and staffed by members of Lac La Croix First Nation. The old site still houses the original facilities which include staff quarters with the entry station office, an aircraft landing dock and a cabin for interior crews, which have fallen into disrepair. The site has been used on occasion by the Lac La Croix First Nation for a Youth Discovery Camp.

Atikokan Entry
The Atikokan Area MNR office, which is located in Atikokan, houses the Quetico Provincial Park headquarters, as well as an entry station. Entries through Batchewaung (via Nym Lake) as well as entries through Sue Falls (via Lerome Lake) are processed at this station.

Entry to the park via Batchewaung Lake is reached through Nym Lake, located outside of the park. Quetico Provincial Park maintains facilities at Nym Lake which include parking, vault privies and a dock. Parking is available at Lerome Lake for entry into the park via Sue Falls/Cirrus Lake.

4.0 NATURAL HERITAGE AND ENVIRONMENT

Quetico is located within ecodistrict 4W-1. The total size of ecodistrict 4W-1 is 1.7 million ha. The ecodistrict is underlain by Early Precambrian metamorphic rocks, including felsic igneous rocks and metasediments, with scattered bands of mafic metavolcanic rocks and small amounts of mafic and ultramafic igneous rocks. The landscape is generally a moderately broken upland, with the bedrock being bare or shallowly covered with acidic sands and stony loams of glacial origin. In the central section of the ecodistrict, there are areas of weakly broken shallow sand plains, some with more calcareous silts and clays (Hills 1959, 1976).

The ecodistrict contains the upper portions of the Pigeon, Kaministiquia, and Rainy Rivers, straddling the Lake Superior (Great Lakes) and Winnipeg (Hudson Bay) watersheds (Figure 22). Rock-rimmed lakes are characteristic of much of the ecodistrict. Hills (1976) referred to the climate in this ecodistrict as dry humid.

The ecodistrict is also located within the Great Lakes St. Lawrence Forest Region, and borders the Boreal Forest Region. This area is characterized as containing a mixture of northern, southern and western elements.

[L. Solomon]

The system of provincial parks in Ontario is based on ecological representation, using landform-vegetation (LV) associations as surrogates of biodiversity. MNR's minimum requirements are to represent at least 1% or 50 ha of each naturally occurring LV association within each of the province's 71 ecodistricts. The MNR's class target for wilderness parks is to establish at least one representative wilderness class park in each of the province's ecoregions. The minimum size target for a wilderness class park is 50,000 ha. Quetico Provincial Park meets the wilderness target for ecoregion 4W (Pigeon River), representing 23% of the total area of 4W. Quetico Provincial Park represents 28.2% of the land base of ecodistrict 4W-1. The number of LV associations is also well represented in Quetico. Of the 91 LV associations in the ecodistrict that meet the minimum requirement of 1% or 50 ha, 66 are represented in Quetico. Fifty of the LV associations in Quetico that meet the minimum requirements are considered critical to achieving representation within the ecodistrict.

4.1 Climate

Quetico's climate is best understood by reviewing certain important climatic variables in a provincial context. Because temperature isotherms trend from the northwest to the southeast, the July mean daily temperature of Quetico is roughly equal to that of Timmins, Ontario. Also, with the mean total annual precipitation within Ontario increasing from west to east, Atikokan/Quetico's mean is 74 cm whereas the corresponding mean for both Timmins and Toronto is 83 cm. Finally, most of Ontario is influenced by the continental polar air mass, while Quetico, being near the western border of the province, is also affected by the continental dry air mass from the prairies (Kronberg et al. 1996). This air mass further decreases humidity while increasing evaporation and transpiration. All of the foregoing factors combine to create a warmer, drier climate than is found throughout most of northern Ontario. The resulting influence on local flora and fauna is profound.

4.1.1 Climatic Conditions

Climate data for Quetico specifically is not collected, but much can be inferred from other sources (see Appendix III for Climate Normals for Atikokan). Select Environment Canada weather data from 1971-2000 for northwestern Ontario locations was used to

describe past weather in the northwest region. Interpolation of this data has provided climate data for Quetico. The park's average annual temperature is 2.0°C (1.6°C in Atikokan) and average annual precipitation is 744 mm (739.6 mm in Atikokan) (Jackson 2007b). The average January temperature is -17.1°C (-18.1 in Atikokan), while the average July temperature is 17.9°C (17.7°C in Atikokan). The average annual snowfall is 206 cm in Quetico, and 220 cm in Atikokan (Jackson 2007b). The number of growing degree-days >5°C (GDD) trends from 1,440 to 1,550 in an east-west direction through the park.

Additionally, Quetico's climate can be inferred by comparison to adjacent areas, such as Atikokan and the Boundary Waters. Climate normals for Atikokan from 1971-2000 are given in Figures 1-3 below.

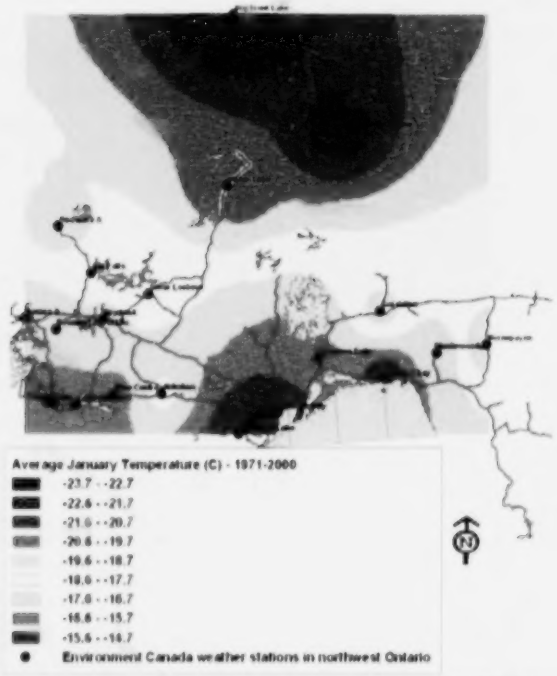


Figure 1: Average January temperature for northwestern Ontario 1971-2000

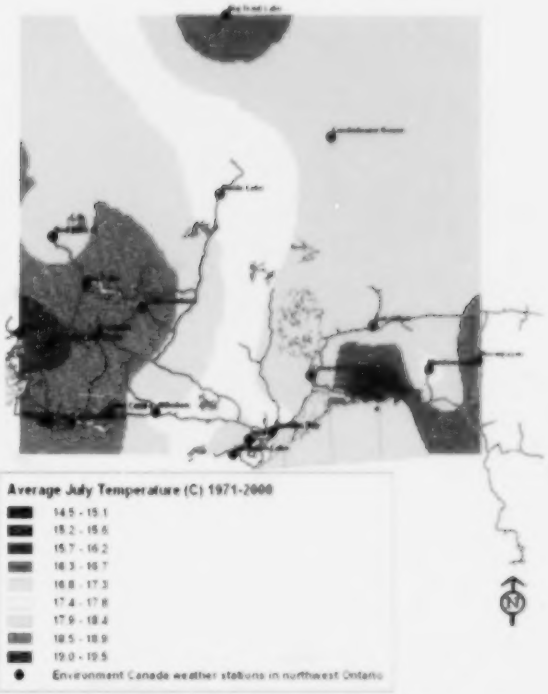


Figure 2: Average July temperature for northwestern Ontario 1971-2000

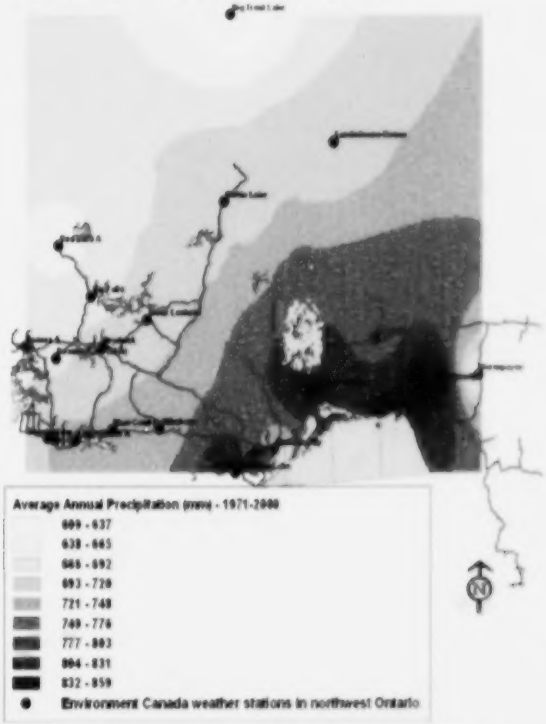


Figure 3: Average annual precipitation in northwestern Ontario 1971-2000

describe past weather in the northwest region. Interpolation of this data has provided climate data for Quetico. The park's average annual temperature is 2.0°C (1.6°C in Atikokan) and average annual precipitation is 744 mm (739.6 mm in Atikokan) (Jackson 2007b). The average January temperature is -17.1°C (-18.1 in Atikokan), while the average July temperature is 17.9°C (17.7°C in Atikokan). The average annual snowfall is 206 cm in Quetico, and 220 cm in Atikokan (Jackson 2007b). The number of growing degree-days >5°C (GDD) trends from 1,440 to 1,550 in an east-west direction through the park.

Additionally, Quetico's climate can be inferred by comparison to adjacent areas, such as Atikokan and the Boundary Waters. Climate normals for Atikokan from 1971-2000 are given in Figures 1-3 below.

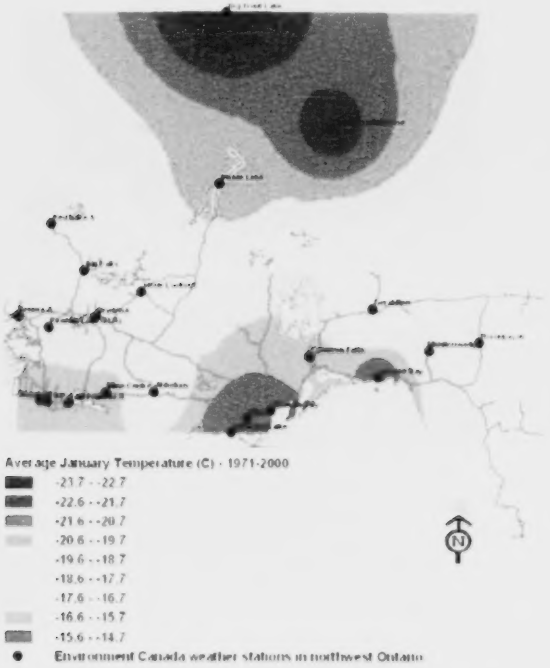


Figure 1: Average January temperature for northwestern Ontario 1971-2000

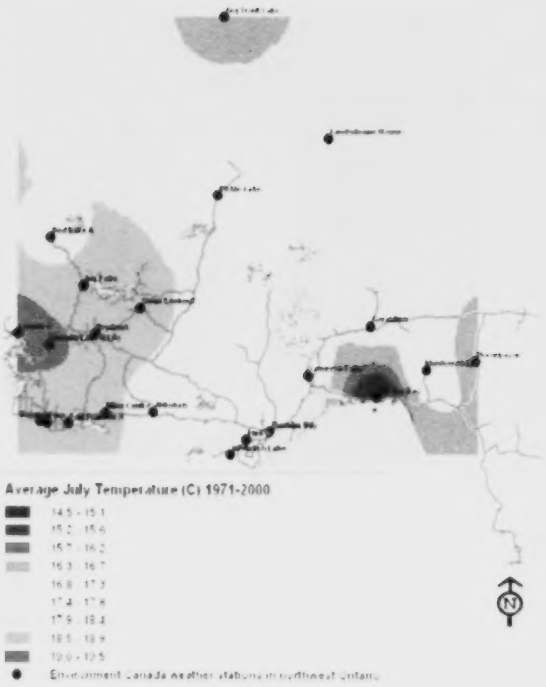


Figure 2: Average July temperature for northwestern Ontario 1971-2000

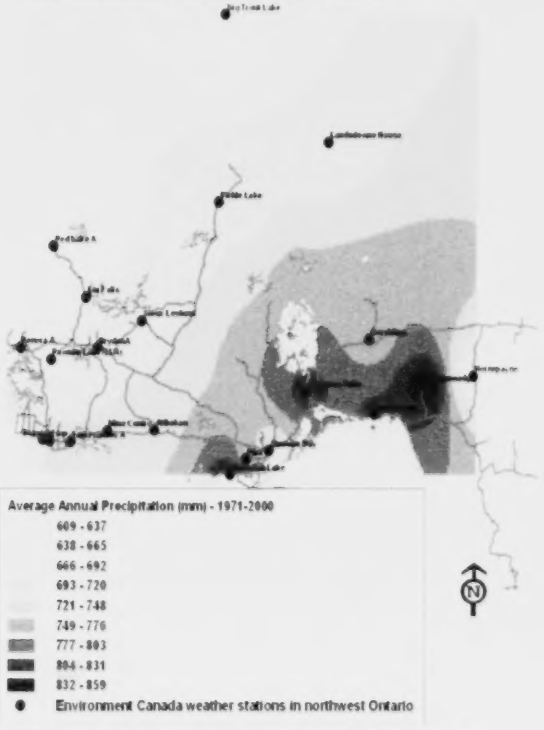


Figure 3: Average annual precipitation in northwestern Ontario 1971-2000

4.1.2 Climate Change

A number of trends in climate have been observed in northwestern Ontario in the past century. Annual mean temperatures in northwestern Ontario have warmed up more than any other area in Ontario, with temperature increases being greatest in the west part of the region, and less to the east (Racey 2004). Total rainfall has increased slightly but precipitation is concentrated in fewer, larger rain events, and both snowfall and the duration snow is on the ground have declined (Racey 2004).

Climate data has been collected in the Atikokan-Quetico area for many decades. While no analysis has been done specifically on Quetico, much can be inferred from analysis of weather data from Atikokan, as it has the closest weather stations to the park. Analysis of climate data for Atikokan shows that Atikokan has been getting warmer since 1996. There has been a general increase in temperatures since 1996 with the average temperature being approximately 1.3°C higher than the 1971-2000 average temperature, see Figure 4 (Jackson 2007a). As well, annual precipitation in the Atikokan area is also decreasing and the variability of precipitation (i.e. the frequency of drought years and high rain years) also appears to be increasing (Jackson 2007a). Analysis of climate data in Atikokan has also shown that the amount of snow cover is steadily declining, as well as the duration snow is on the ground, as shown below, in Figures 5 and 6. If the recent trend of increasing spring temperatures continues, this would result in an earlier snow melt and shorter snow seasons. There has also been an increase in fire season length and an increase in higher intensity forest fires in early spring (Racey 2004).

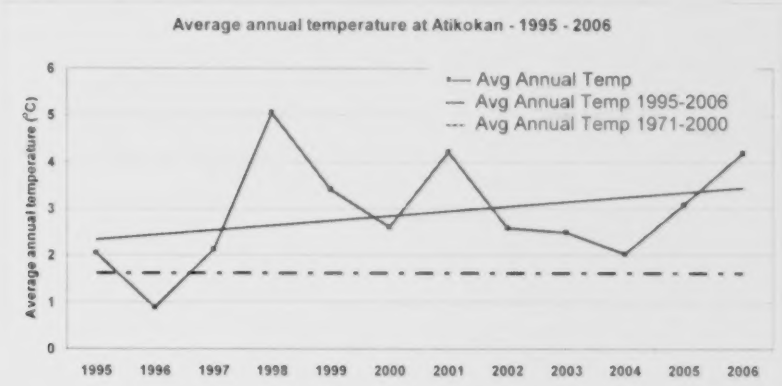


Figure 4: Average annual temperature for Atikokan, Ontario for the period 1995 to 2006 compared to 1971-2000 average of 1.6°C (dashed line)

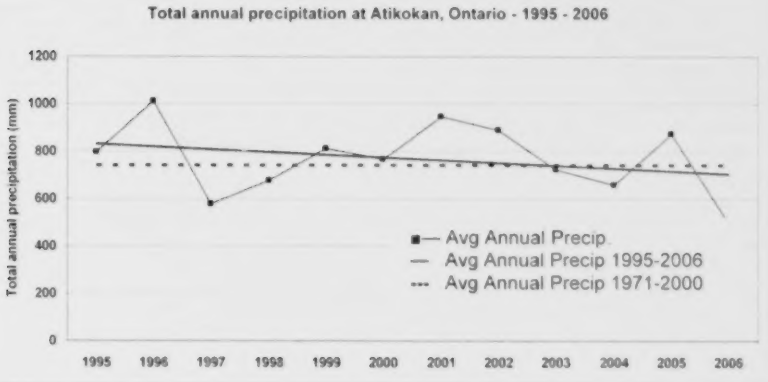


Figure 5: Average annual precipitation for Atikokan, Ontario for the period 1995 to 2006 compared to 1971-2000 average (dashed line)

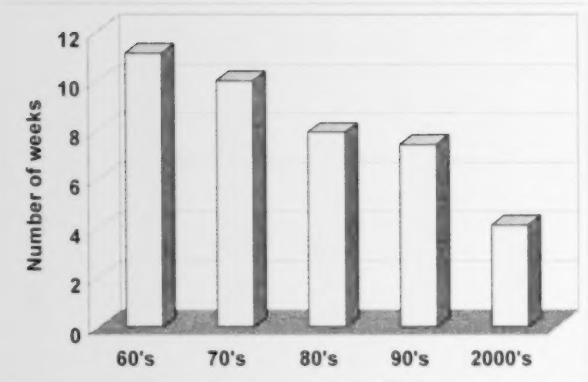


Figure 6: Average number of weeks by decade with more than 40 cm of snow for Atikokan

Researchers have projected that at 1990 levels of greenhouse gas emissions northwestern Ontario will see a 1 to 1.5°C temperature increase and 10% decrease in precipitation over the next 40 years, and a 4 to 5°C temperature increase and a 20% decrease in precipitation over the next 100 years. Some studies suggest that northwestern Ontario will experience some of the largest temperature increases in the province (Colombo et al. 1998). Other predictions for this area include minor changes in total annual precipitation with higher spring precipitation and lower summer; reduction in winter snowfall and snow depths; and increased variability in temperature and precipitation with more precipitation occurring as extreme storm events (Racey 2004, Wooten et al.1993). In association with this, more extreme weather events, greater spring flooding, and fewer days with ice cover may also occur. This will likely cause an increase in lake water temperatures and productivity (OMNR, unpublished data). These changes are expected to cause a number of impacts on aquatic ecosystems, although the severity and rate are not yet well understood.

A more recent study suggests a different scenario; not only will temperatures rise, but precipitation will increase as well (Lemieux et al. 2007). Based on climate data for eight Ontario provincial parks, Lemieux et al (2007) predict that a corresponding increase in forest fire severity, reduced ground snow periods, and reduced ice cover will have considerable implications to ecosystem composition (including biodiversity), structure, and function. Forest and vegetation distribution patterns will change, and wildlife species will shift to adapt as their habitat shifts (Lemieux et al. 2007). Quetico specifically is expected to experience an increase in both temperature and precipitation by the 2080s (in each scenario used in the study) (Lemieux et al. 2007).

The Atikokan-Quetico area shows a trend towards hotter days in summer, milder days in winter, and reduced snow cover, although the trend for precipitation is not as clear. In addition, there are many changes predicted for the ecosystems of northwestern Ontario. These include:

- large-scale shift in geographic distribution of species
- range expansion of southern species and range contraction of northern species as habitat conditions change,
- increase in aggressive insect and disease infestations experienced by environmentally stressed trees,
- increase in area burned by forest fires
- warmer water temperatures and reduction of coldwater fish habitat,
- change in overall fish production,
- decline of moose in southern portions of the region associated with disease and heat stress (Racey 2004).

These trends can be expected to play a major role in shaping the future of the Quetico area, both in terms of changes to distribution and diversity of wildlife and vegetation.

Quetico Provincial Park, in addition to the rest of Canada's parks and protected areas, faces new challenges as a result of climate change. Quetico has few rare, threatened, or endangered species and does not contain any critical habitat for these species, but the implications of climate change on flora and fauna are still considerable. Warming temperatures may make it easier for species from other ecosystems to find and fill ecological niches in existing protected areas (Lemieux et al. 2007). This natural shift in species distribution in response to climate change would previously have been considered an invasion by non-native species. The fundamental way these changes are understood and responded to will have to be re-evaluated.

4.2 Earth Science

Quetico Provincial Park lies on the bedrock of the Canadian Shield, and its topography has been shaped by billions of years of erosion, including over two million years of glacial advances and recessions. In the majority of Quetico, the bedrock is granitic in composition (Figure 23). This rock is extremely hard

and resistant to erosion, releasing much needed nutrients extremely slowly and in an acidic form which is not readily used by most plants. For these reasons natural communities on granite in Quetico are low in productivity: plants and animals are relatively few in number and species diversity is poor.

The metamorphic rocks of sedimentary and volcanic origin covering the remainder of the park are quite different from the granite. They are much softer, eroding much more easily and releasing abundant nutrients. Even more important, they are less acidic, providing nutrients in a more basic form which is readily used by most species of plants. The end result, in comparison to the granite area of Quetico, is a more productive ecosystem supporting larger numbers and greater diversity of plants and animals.

The first glaciers flowing south and southwest across the Quetico region inherited the gently rolling topography seen in the north end of the park today. The lakes of this area have lower shorelines and are shallower than typically seen elsewhere. Quetico's long, deep northeast-southwest oriented lakes in the rest of the park are a result of successive glaciers moving down from the northeast, scouring the land and removing enormous quantities of soil and rock. The nature of the bedrock in the southern portion of the park resulted in sharp vertical rock faces along shorelines. The soils in Quetico today are remnants of those that were removed by southward glacial movements. Very few soils occur in the park due to their removal and redeposition to the south. The landforms of the park are largely the result of these glacial and postglacial events.

4.2.1 Bedrock Geology

Quetico Provincial Park lies on the southwestern portion of a vast area of ancient rock known as the Canadian Precambrian Shield. The Shield forms the foundation of the North American continent and consists of some of the oldest rocks on earth. It is divided into provinces and subprovinces on the basis of overall differences in internal structural trends, age, lithology (rock types), metamorphic grade (alteration) and style of folding (Thurston 1991). Quetico Provincial Park lies within the Superior Structural Province of the Shield, and encompasses portions of two subprovinces, the Wawa Subprovince in the southeastern portion of the park, and the Quetico Subprovince in the remaining portion of the park. All the rocks within the park boundaries are of Archaean age, having last been affected by a major period of mountain-building during the Kenoran Orogeny some 2 700 to 2 500 million years ago.

Fern Lake metasedimentary fold [S. Walshe]

Wawa Subprovince

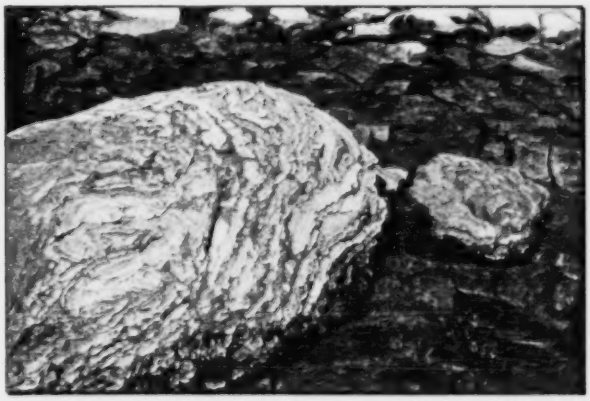
The oldest rocks in the park consist predominantly of metamorphosed volcanic rocks which lie along the northern boundary of the Wawa Subprovince. The exposed portions of the Wawa Subprovince extend from Minnesota, along the north shore of Lake Superior, to just short of the Ontario-Quebec border. The predominantly volcanic rocks of the Wawa Subprovince lie structurally beneath the metasedimentary rocks of the Quetico Subprovince. The subprovince boundary is quite indistinct throughout its exposure in the park (Williams et al. 1991). The contact zone is considered to be either a depositional change from volcanic to sedimentary rocks, or a thrust fault.

The metavolcanic rocks are grouped into distinct sequences, from north to south in the subprovince (in the park): the Burchell assemblage, an extension of the Shebandowan Greenstone Belt consisting of a series of basaltic flow sequences; the Quetico assemblage, a metasedimentary sequence; the Saganagons assemblage, massive to pillowed basaltic flows; and the Knife Lake assemblage, a sequence of detrital sedimentary rocks including wacke, arkose, tuff, conglomerate and minor basaltic flows. The Knife Lake Fault is a prominent feature in the park that marks the north edge of the Saganagons assemblage. Volumetrically, these rocks make up only about 20-30% of the exposed Wawa Subprovince. The rest of the subprovince consists predominantly of granitoid rocks (intrusive felsic rocks of granitic composition) consisting of

massive to foliated and gneissic tonalite granodiorites to granites (Williams et al. 1991).

The metavolcanic rocks are believed to predate all other rocks in the region. They form the source rocks for the detrital sediments of the sedimentary belts to the north of the Wawa Subprovince. These rocks were probably formed over 2700 million years ago, the age of the oldest intrusive granitic rocks found in the area of the park (Williams 1991).

Associated with some of the metavolcanic rocks are long, northeast-trending, continuous units of iron formation. These units are banded and consist of hematite and/or magnetite interbanded with chert and jasper. The iron formations accumulated in shallow basins during periods of relative quiescence in the volcanic activity (Williams et al. 1991). Within the park, these units show outcrops along the shorelines of Emerald, Cypress, This Man, That Man and Carp lakes. The iron formations have been studied for their potential economic values in the past.



'Ribbon rock', iron formation rock on Knife Lake [S.Walshe]

Quetico Subprovince

The majority of the park (its northern portion) is underlain predominantly by altered sedimentary rocks of the Quetico Subprovince. The outcrop belt of the subprovince extends from Minnesota to western Quebec. Greywacke and siltstone, commonly metamorphosed to biotite-quartz-feldspar schists and gneisses, are the major rock types in the subprovince. They were derived from the higher volcanic terrain of the adjacent Wawa and Wabigoon subprovinces and were deposited in a shallow, subsiding basin adjacent to these volcanic belts (Williams 1991). Volumetrically insignificant but notable occurrences of iron formation, conglomerate and ultramafic metasedimentary rocks also occur in the subprovince. All these assemblages have been intruded by felsic to mafic intrusive rocks.

The gneissic rocks dominate the Quetico Subprovince. These consist predominantly of massive granodiorite to granitic, foliated and gneissic rocks derived from wackes. They are generally exposed in the park as low, glacially smoothed knobs and ridges best seen from the shorelines of the park's many lakes. The sediments from which the gneisses are derived are believed by some authors to be the oldest rocks in the Precambrian Shield.

Bedrock outcrop [M. Mosley]

A sedimentary-volcanic sequence known as the Poohbah Lake Complex is located at Poohbah Lake (Figure 23). It is an alkaline intrusive sequence comprising syenite and nepheline syenite associated with sheets of leucogranite. The complex is significant in that it is one of the oldest known alkaline intrusives in the Shield, with an age of some 2 700 million years (Williams 1991). The type locality[4] of the rock malignite, a potassium syenite, is located along the shores of the Maligne River as part of the Poohbah Lake Complex in the park (identified by Lawson in 1896).

Other intrusive rock types include granite, syenite, pegmatite and migmatite. These are related to a major mountain-building period, the Kenoran Orogeny, which affected all rocks in the park. The pegmatite is significant because it contains well-

[4] A type locality is one in which the original, or subsequently designated, type representative of a named feature was first identified and described. It constitutes the standard for the definition and recognition of that feature, in this case, the mineral malignite, named for its occurrence at Maligne Lake. The type locality identifies the first place that the mineral malignite was identified, described and named. Type localities are generally used to identify and compare other occurrences of that mineral (Kor 2007).

developed crystals of spodumene (the ore mineral of lithium), and beryl in exposures west of Poohbah Lake along the Maligne River. The granitic terrains form moderate to low rolling topography. Where faults crosscut this bedrock, however, precipitous slopes may be formed, as in the Man Lakes chain.

4.2.2 Surficial Geology

The shape of the land surface in the park area is the product of 2 500 million years of erosion since the last tectonic activity uplifted the terrain in a great mountain-building episode. The low, rolling topography had already been established when the first glaciers of the Quaternary Period flowed south and southwest across the Quetico region some 2 million years ago, stripping away any existing soils and flora and gouging and scratching the underlying bedrock. Lake basins were deepened as badly-weathered bedrock surfaces and fractured joint and fault zone debris were removed by successive glacial advances.

In the Quetico area, the Wisconsinan Stage was witness to many advances and retreats of the continental ice masses, though only the features associated with the last of these, the Late Wisconsinan, are preserved. The Late Wisconsinan glaciers reached their maximum southern limit in the upper states of the USA, some 20 000 yBP (years Before Present), and began to withdraw from that position about 18 000 yBP. The ice withdrew from the area of the park for the last time about 11 000 yBP as the ice front stabilized briefly along the Steep Rock Moraine and the subsequent Eagle-Finlayson Moraine (Figure 24). Glacial Lake Agassiz was in contact with the ice margin along its northern shoreline, and covered most of the low-lying areas in the Rainy River valley (Barnett 1992). Retreat of the ice margin into the Great Lakes basins resulted in changing outlet channels of the lake and periodic flooding of the lowland areas in northwestern Ontario, including the Quetico area.

Glacial and postglacial features and landforms left behind by the last glacial retreat in the park include two sets of glacial striae, reflecting local variations in the movement of the ice, segments of two recessional moraines (a type of end moraine) associated with ice-halt positions during the retreat of the final ice sheet, raised shoreline features and lacustrine deposits of glacial Lake Agassiz, and bare to sporadically mantled bedrock, the result of wave-washing of the Shield by the waters of glacial Lake Agassiz (see Figure 7). The predominant surficial deposit in most of the park consists of a thin, discontinuous mantle of sandy till[5] deposited as a ground moraine (Figure 24).

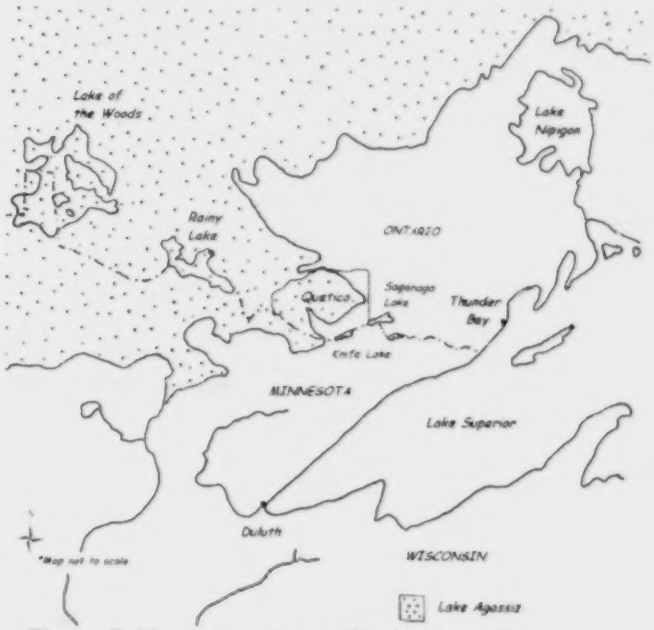


Figure 7: Maximum extent of Lake Agassiz (Adapted from Teller and Thorleifson 1983)

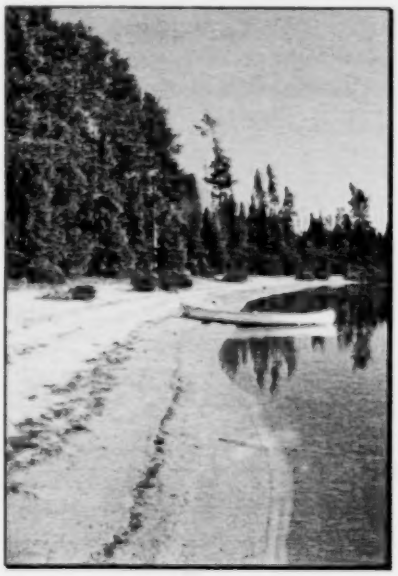
Glacial striae are shallow grooves or scratches gouged into the bedrock surface by rock fragments embedded in the base of the overriding glacier. The striae indicate the erosive power of the glaciers, as well as the direction of ice movement. In Quetico Provincial Park, many outcrop surfaces, especially along the shores of Sturgeon, Knife, Cypress, Saganagons and Cairn lakes, display two sets of glacial striae, indicating that at least two glacial movements affected the park area (Dreimanis 1953). The older set indicates a glacial movement from the northeast, while the younger set indicates a southerly movement of the ice. On bedrock outcroppings at Kasakokwog Lake and Cirrus Lake, moon-shaped crescent marks associated with the striae also indicate the passing of the ice. These are commonly known as chattermarks.

The park area was freed of ice for the last time between about 11 000 yBP and 10 500 yBP. As the

[5] A note on Figure 18 - while the predominant surficial deposit in Quetico is a thin layer of soil over bedrock, its shallow depth results in a classification of "Precambrian Bedrock" in the legend of the Surficial Geology map.

glaciers melted, the debris embedded throughout the ice was deposited on the surface as a discontinuous till or ground moraine. The Steep Rock Moraine is a ridge of glacial ice-contact sediment marking a temporary halt in the retreat of the ice in the northeastern corner of the park (Figure 24). Regionally, the Steep Rock Moraine extends roughly from Atikokan to Thunder Bay. A small portion of another moraine, the extensive Eagle-Finlayson Moraine, also occurs in the northeastern corner of the park. To the north and west of the park, these two moraines may have been contemporaneous (Zoltai 1965; Barnett 1992), but within the park, the moraines represent two distinct ice-halt positions.

As the last glaciers retreated across the region, the waters of glacial Lake Agassiz inundated the low-lying areas, spreading eastward from its main basin in the Red River Valley. By about 10 500 yBP, glacial Lake Agassiz had flooded most of the low-lying areas of the park. It deposited fine-grained sediments in small pockets between bedrock highs, and also wave-washed the tops and flanks of topographically higher bedrock knolls and ridges. Eskers and outwash sediments were deposited sporadically in the park during the ice retreat. During halts in the retreat of the ice front, the Steep Rock Moraine and subsequent Eagle-Finlayson Moraine were deposited while forming the north shore of the lake. Broad beaches occur along the length of the moraines, both in the park and well beyond the park area (Zoltai 1965). One beach complex in the park is well-exposed on the Steep Rock Moraine at Pickerel Lake.



After many local fluctuations, the waters of the glacial lake were finally drained from the area by about 9500 yBP. Vegetation patterns were established in the relatively warm, dry climate of te periglacial environment by this time (Fox 1975). By about 7800 yBP, Quetico assumed its present appearance and the drainage that we see today.

Thick deposits of fine-grained sediments of silt and clay occur in the Cache River basin north of Ferguson Lake, and in isolated pockets in low-lying areas of the park (Figure 24). These represent deepwater deposits in glacial Lake Agassiz. These are commonly associated with coarser deposits of sand and gravel, which represent nearshore lake deposits or deposits of glaciofluvial outwash.

In summary, Quetico Provincial Park exhibits surficial features related to the retreat of the last Wisconsinan glaciers. A hummocky topography consists of bare bedrock, bedrock mantled with thin till deposits, as well as pockets of lake clays and other lacustrine deposits. Two ridges of sand and gravel, up to 50 m high, trend northwest-southeast across the northeastern park area, the result of the accumulation of glacial debris at the edge of the temporarily stabilized ice front. Glaciofluvial outwash sediments, including several small eskers, also occur locally in the park.

4.2.3 Soils

By far the most widespread soil substrate in Quetico is a till (in the form of a ground moraine) composed of sand mixed with gravel, stones and boulders. Resting on bedrock, it forms a thin, discontinuous layer usually less than one metre deep. This material, moved only a short distance from its source by glaciation, can be divided into two broad categories depending on the type of bedrock from which it was derived. Ground moraine derived from granite is now situated either over granite or a short distance southwest of the granite source. This very low base (i.e. acidic) material is extremely low in nutrients; consequently, the quality and the diversity of the plants and animals it supports are low. Ground moraine derived from metasedimentary and greenstone bedrock, and now found either on this type of rock or a short distance to the southwest, is of a low base type (i.e., moderately acidic). Available nutrients are relatively abundant and in a form more readily usable by vegetation. Consequently, plants (and animals) are found here in greater numbers and

variety.

Stretching across the east end of Pickerel Lake at 'the Pines' area, the Steep Rock Moraine extends south-eastward into the park, past Baptism Lake, Cache Lake and Lindsay Lake. This recessional moraine, deposited at an ice-halt position as the last glaciers receded, is comprised of sands, gravels, stones and boulders. In places, the Steep Rock Moraine rises to heights of 50 m.

While glacial Lake Agassiz occupied low-lying areas exposed by the retreating ice sheet, glaciolacustrine sediments were deposited, consisting of silts and clays, some of which are varved. Varves are thin annual layers composed of couplets of clay (winter layer) and silt (summer layer). Those clays, now occurring in isolated pockets ranging in thickness from 0.5 to 10 m, are found in valleys and adjacent to rock knolls and ridges. Being very rich in nutrients, these deposits support southern species of plants which are unable to survive in the more sterile, acidic soils characteristic of Quetico. Consequently, although not significant in terms of the scale of their occurrence, these soils are of high interest to the botanist.

Deep soils found along the Cache and Wawiag Rivers are also of particular interest. Here, deep glaciofluvial and modern outwash and alluvial deposits of sands and gravels were deposited as glacial Lake Agassiz occupied the area. In later, quiet-water times of the lake, silts and clays were periodically deposited in association with the nearshore and outwash sediments. Numerous plants, uncommon in the Shield, have been able to gain a foothold on this fertile alluvium.

Organic soils, comprised of partially decomposed plant remains, can be found throughout the park in poorly-drained depressions surrounded by bedrock. Prevented from disintegrating completely by their cool, wet acidic environment, these remains have collected on top of older deposits creating deep, spongy mats of wetland vegetation, including peat.
In most of the park, extensive stretches of predominantly bare bedrock are present. Here, overburden was removed by wave action of glacial Lake Agassiz.

Weak podzols found on well-drained sandy sites particularly under pine are most common. A brown, boreal podzolic profile is normally found in less acidic sites associated with such species as aspen, white birch, white spruce and balsam fir. Grey, wooded soils are much less common, being found in rich, well-drained substrates containing clay or silt. Gley and peat occur in the innumerable acidic, poorly-drained sites. Muck is found only locally in wet areas, where water movement and the presence of basic nutrients aid the decomposition of organic matter.

4.2.4 Drainage

Ancient drainage channels were likely significantly altered or destroyed by the action of the ice sheets during the last 2 million years. The result is the haphazard drainage pattern which now characterizes Quetico. Drainage is affected by the patterns, structure and erosional differences of the local bedrock geology. The overall waterflow within the park is directed westward through the Namakan River system, the Loon River system, to Rainy Lake, Lake of the Woods, and eventually to Lake Winnipeg and northwards (Figure 22). Ultimately, all of Quetico's waters drain to the west, through the Rainy Lake basin, the Lake of the Woods basin, the Lake Winnipeg basin, and finally into the Hudson Bay basin. While all Quetico waters lie within the Arctic watershed, it is important to note that several of Quetico's secondary and tertiary watersheds do not all lie completely within its boundaries. As a result, activities and developments occurring outside the park but within these watersheds can have a direct impact on Quetico's water quality.

4.2.5 Earth Science Significance

Detailed earth science inventories of the park have not been attempted in the past. Detailed geological mapping has also not occurred for most of the park area, with the exception of selected portions of the pre-park mining areas along the north side of Knife Lake. A detailed geological inventory was beyond the scope of this report. Instead, a regional review was completed based on existing literature, remote sensing investigations (primarily air photo interpretations) and a helicopter overview over the park's most significant features.

Potentially significant earth science features were identified in the park by former Park Naturalist Shan Walshe (undated internal notes). Most are point source features which likely do not require protective

zoning to highlight their values, but these features need to be investigated in more detail for their value to interpretive themes.

A) Cultural/historic mining activity in SE corner of park: Occurrences of gold, copper, iron formation, lithium, barium and other mineral showings, with associated remnants of exploration and mining activity could provide a link between geology and history.

B) Subprovince boundary: The boundary between the Wawa and Quetico subprovinces (in the Precambrian Superior Province) crosses through the park. Its characteristics and identification could be investigated for scientific and educational (interpretive) values.

C) The Eagle-Finlayson Moraine: This moraine is represented in two other parks, Blue Lake Provincial Park and Woodland Caribou Provincial Park. Both of these represented segments incorporate very short portions of the moraine which have been affected by shoreline process in glacial Lake Agassiz. The segment represented in Quetico needs to be inventoried to determine its significance in this context.

D) The Steep Rock Moraine: This moraine is not represented elsewhere in the parks system. Its occurrence in Quetico Provincial Park is therefore provincially significant.

E) Ice-contact sediments: Two additional segments of ice-contact sediment identified as "end moraine" deposits. Their location and orientation suggests that these are in fact eskers. Reconnaissance aerial review suggests that most of these features are bedrock-cored features.

F) Caves: It is unknown what natural features are represented by the caves referred to in Walshe's map and notes. These could be shore caves formed at the shoreline of glacial Lake Agassiz (this is unlikely, but would be very uncommon and significant if true), solution caves in marble (also unlikely), or fracture caves formed by the widening of bedrock faults or other lineaments, either horizontally or vertically (most likely). Natural caves are not common in this part of the province, and could be significant.

G) Mineral Occurrences: There are many documented occurrences of well-developed and abundant minerals, usually associated with pegmatites. They include beryl, garnet, spodumene, serpentine, malignite and cordierite. Occurrences of the metals copper, gold and iron formation are also known. The mineral malignite in the Poobah Lake Complex is considered to be its type locality.

Provincially Significant Landform Features

Agnes-Louisa Lakes Esker Moraine Complex

A small esker at the south end of Agnes Lake and Louisa Lake in the very south-central portion of the park empties onto the proximal (near) flank of a small unnamed and previously unrecorded moraine element. This moraine has no known association with other, more prominent moraines in the region, and likely represents a brief and local halt in the retreat of the last glacier. There are indistinct knolls and flat-lying deposits associated with these features which are interpreted to represent ice-contact sediments associated with the depositional environment. All the features described here are well-developed and in pristine condition.

McKenzie Lake Moraine Complex:

A complex of relatively small, parallel end moraine segments, with intervening ice-contact sediments, including deltaic and kame sediments, occur at the east-central boundary of the park, east of McKenzie Lake. This well-developed complex is interpreted to represent a portion of the Steep Rock Moraine. This portion of the moraine appears not to have been modified by wave and current action in glacial Lake Agassiz. The Steep Rock Moraine is not represented elsewhere in the protected areas system, and the occurrence at McKenzie Lake is excellent in form and complexity. It is therefore considered to be provincially significant.

Sawmill Lake Kame-Moraine

A small segment of the Steep Rock Moraine is here anchored by several large kame mounds. This represents another aspect of this moraine, and is considered provincially significant. The Steep Rock Moraine lies almost entirely within the boundaries of Quetico Provincial Park, and the various aspects of its morphology are well-represented in the park.

4.3 Life Science

The flora and fauna of Quetico Provincial Park have developed following the recession of the last glacier and draining of glacial Lake Agassiz, which once covered much of the area. Glacier scouring deepened lake basins in some areas and left behind a thin layer of nutrient-poor sandy till over bedrock, resulting in low diversity of plants and animals in most of the park. Low-lying areas were flooded by meltwater and Lake Agassiz left deposits of fine-grained sediments in isolated pockets. These soils are higher in nutrients than those in the rest of the park, contributing to higher productivity and a greater diversity of species than is found in the rest of Quetico. More recently, natural and human-caused disturbances such as fire, windstorms, and logging have also had an impact on the terrestrial ecology of the area.

4.3.1 Vegetation

Quetico is located within the Great Lakes-St. Lawrence Forest Region, and borders the Boreal forests to the north and the Great Plains forests to the west and southwest. As a result, Quetico is characterized as containing a mixture of mostly northern, as well as some southern and western elements, resulting in a diversity of plant species typical of the different regions. To date, 666 plants have been identified in the park, the majority of which are terrestrial. The aquatic plant community has not been sampled to the same degree, so there may be many more plant species discovered in the future.

[M. Mosley]

Tree species such as eastern white pine (*Pinus strobus*), red pine (*Pinus resinosa*), and large-toothed aspen (*Populus grandidentata*) are important, but often are mixed with species of boreal affinity, such as jack pine (*Pinus banksiana*), trembling aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), black spruce (*Picea mariana*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*). In the nutrient-poor acidic soils overlying granite, understory vegetation is almost exclusively boreal in nature as the harsh environment prevents the establishment of species belonging to other forest types. Leatherleaf (*Chamaedaphne calyculata*), Labrador tea (*Ledum groenlandicum*), sphagnum moss (*Sphagnum* spp.) and a dozen or so other hardy northern species recur somewhat monotonously. Red pine and white pine, because of their habit of growing in extensive, almost pure stands on the shorelines of lakes and rivers, appear to be much more abundant than is actually the case.

Southern and western species such as yellow birch (*Betula alleghaniensis*), American basswood (*Tilia americana*), northern red oak (*Quercus rubra*), bur oak (*Quercus macrocarpa*) and silver maple (*Acer saccharinum*) are present, but are less frequently encountered. At the edge of their range, these species are restricted to sites of hotter-than-normal microclimate on south-facing slopes, rocky ridge tops, lakeshores and islands, especially where richer, less acidic soils are present (i.e. metasedimentary and greenstone bedrock areas, alluvium on river floodplains and clay pockets). Characteristic shrubs and herbs of this southern association that are found in the park include hawthorn (*Crataegus* spp.), poison ivy (*Rhus radicans*), stinging nettle (*Urtica dioica*), jack-in-the-pulpit (*Arisaema triphyllum*) and blunt-lobed hepatica (*Anemone americana*). On wetter mineral sites, black ash (*Fraxinus nigra*) American white elm (*Ulmus americana*), red maple (*Acer rubrum*), and eastern white cedar (*Thuja occidentalis*) are found, and on organic substrates, black spruce and tamarack (*Larix laricina*) predominate.

Evidence of the western influence on the local flora is provided by elements of no fewer than three Great Plains forest species, namely basswood from the dry-humid midwestern United States, red oak from the sub-humid mid-Mississippi area and bur oak-aspen from sub-humid Manitoba. As with mixed forest elements, the western species are normally confined to richer, less acidic sites. In addition, they favour the

hotter, drier sites, often located on almost bare metasedimentary or greenstone bedrock along a lakeshore or near the top of a south-facing slope. Shrubs and herbs belonging to this western association include smooth sumac (*Rhus glabra*) and freshwater cordgrass (*Spartina pectinata*).

Invasive Non-native Species

Seventy-two species, or 10.9% of the total flora (666 recorded vascular plants) of the park, are considered non-native to Ontario (Solomon 2007). The majority of non-native plants occur in the Dawson Trail Campground, quite often in disturbed areas, and were likely carried there by human activity.

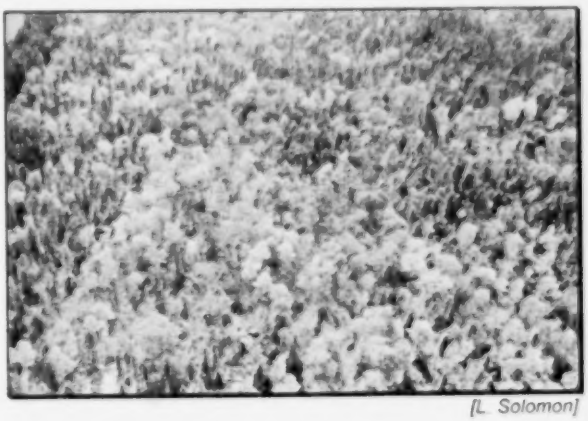
Only one non-native plant species found in the interior of the park is considered to be invasive. Purple loosestrife (*Lythrum salicaria*) was first recorded in 1995 on Burke Lake. Purple loosestrife was reported from the same site in 2005 (Skinner, pers. comm.) who reported 10 to 20 plants. No other occurrences have been reported in the park, however in 2006 several stands of purple loosestrife were found on the U.S. side of Knife Lake. Purple loosestrife causes a decline in plant diversity by displacing native vegetation and affects wildlife by reducing food sources and habitat for waterfowl and spawning grounds for fish.

Forest Communities

Quetico is wholly located within the Quetico-Rainy River Section of the Great Lakes - St. Lawrence Forest Region. This section of the Great Lakes – St. Lawrence Region extends to approximately 100 km north of the U.S. border between Thunder Bay and Manitoba. This section represents the northern limit of the mixed forests of Minnesota and Wisconsin as well as the western limit of the Great Lakes – St. Lawrence Forest Region in Canada.

Fire, fire suppression, and logging have exerted strong influences on the present forest cover of Quetico. Because of its drier climate, this region is more susceptible to outbreaks of fire than much of the remainder of Ontario, although it is likely that disruption of the natural fire cycle due to fire suppression has actually increased the forest's susceptibility to fire outbreak. Approximately 50 percent of Quetico's area has been burned over in the past 100 years. With regard to logging, the better stands of red and white pine were removed between 1900 and 1946. Between 1961 and 1971, the clear-cutting of jack pine and black spruce took place in the northeastern sector of the park. As a result of these disturbances, less than 5 percent of Quetico's forests are over a hundred years old, while approximately 50 percent are under 60 years of age. Correspondingly, there is a scarcity of dominant stands of shade-tolerant climax forest species such as balsam fir and white spruce.

Mixed Forest is the most common landcover (forest community) class in Quetico, occurring on 51% of the landbase (Figure 25). Coniferous Forest and Sparse Forest are also common landcover classes in the park, occurring on 19% and 20% of the landbase respectively. Most of the Coniferous Forest landcover occurs in the northeast corner of the park, where logging most recently occurred. Incidental observations confirm that the majority of the Mixed Forest in the park is mainly coniferous.



[L. Solomon]

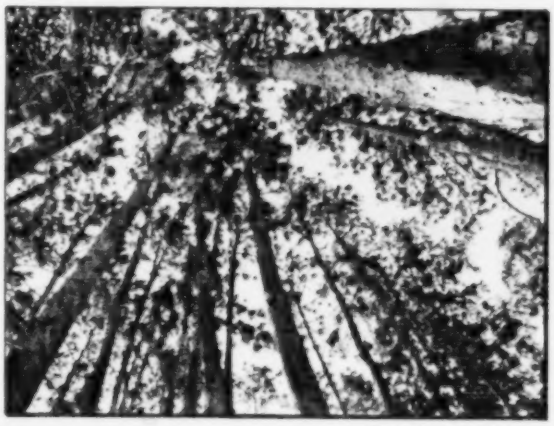
Jack pine and black spruce with hardwood species such as white birch, trembling aspen, and large-toothed aspen *(Populus grandidenta)* on shallow to medium till make up over half of the park landbase. Jack pine is typically the dominant overstory species, but communities may be dominated by either species, or co-dominant. Hardwood species typically found in association with these communities include trembling aspen and white birch. These communities are shrub rich on deeper soils, with mountain maple *(Acer spicatum)* dominating on many sites. Other typical understory species include beaked hazel *(Corylus cornuta)*, bush honeysuckle *(Diervilla lonicera)* and balsam fir. Low shrub and herbaceous species associations include bunchberry *(Cornus canadensis)*, large-leaved aster *(Aster macrophyllus)*, starflower (*Trientalis borealis*), rose twisted-stalk

(Streptopus roseus) and in the north section of the park, dense mats of trailing arbutus *(Epigea repens)* are found on sandy soils. Jack pine and black spruce communities that are found on shallow soils tend to be shrub and herb poor, with a carpet of feather mosses, such as Schreber's moss *(Pleurozium schreberi)* and plume moss *(Pitilium crista-castrensis)*. In the absence of fire, many of these communities become dominated by black spruce.

Hardwood forests make up a significant portion of the park landbase, most often occurring on deeper, nutrient rich soils. Trembling aspen and white birch are the dominant tree species, although large-toothed aspen is dominant in many communities, especially in the southern portion of the park. Where balsam fir is present, it is often a dominant species in the secondary stratum of the canopy, although in older stands, balsam fir may become the dominant species in the upper canopy. Red pine and white pine are also found in these communities as minor components in the supercanopy. Red oak is rarely found in these communities, although it has been found in hardwood and mixedwood communities along the border lakes and the Maligne River. Like many forest communities in Quetico, mountain maple is often the dominant shrub species. Other typical shrubs encountered in hardwood communities include bush honeysuckle, beaked hazel, red raspberry (*Rubus idaeus*), green alder (*Alnus crispa*), serviceberries (*Amelanchier spp.*), round-leaved dogwood (*Cornus rugosa*) and downy arrowwood (*Viburnum rafinesquianum*). Red maple is also encountered in many hardwood stands as a tall shrub and is rarely encountered in the canopy. The herbaceous layer is dominated by wild sarsaparilla (*Aralia nudicaulis*), Canada mayflower (*Maianthemum canadense*), bunchberry, bluebead lily (*Clintonia borealis*) and goldthread (*Coptis trifolia*).

Hardwood forests found on moist to wet sites do not occupy a large percentage of the landbase, but are frequently encountered in wet depressions often seen along fast flowing streams in Quetico where the soils tend to have a high clay or organic component. Black ash is often dominant, with trembling aspen and white elm common. These communities also support more uncommon species such as bur oak, red ash (*Fraxinus pennsylvanica*), and Manitoba maple. The herbaceous layer tends to be rich, with Canada bluejoint grass (*Calamagrostis canadensis*), mitrewort (*Mitella nuda*), dwarf enchanter's nightshade (*Circaea alpine*), woodland horsetail (*Equisetum sylvaticum*), and shield fern (*Dryopteris spp.*). Species that are more common south and west of the park are also found here including spikenard (*Aralia racemosa*), Virginia creeper (*Parthenocissus vitacea*), black snakeroot (*Sanicula marilandica*), and poison ivy (*Rhus radicans*).

Red and white pine forest communities make up a small percentage of the park landbase, with larger stands found in the southern portion of the park, particularly in the Hunter Island area. These communities were most likely much more common before logging and fire suppression. Most of the red and white pine communities in the park occur as mixedwood stands, with hardwood and other conifer species occurring in the secondary canopy. Trembling and large-toothed aspen are common secondary canopy species, with red maple and eastern white cedar typically seen in these communities in the southern section of the park on metasedimentary and volcanic bedrock. The shrub species are typical species found in many forests in Quetico, with the exception of common juniper (*Juniperus communis*), which can be quite abundant in these communities, especially in stands dominated by white pine.



Red pines [L. Solomon]

Wetland Communities

Non-forested wetlands, including bogs, fens, shore fens, thicket swamps, and marshes, are a small component of the overall landcover within the park, but are conspicuously spread throughout the park and are found on almost every lake, especially along shorelines. Emergent and open-water marshes on lakes and rivers within the park are unmapped within the landcover analysis, but cover thousands of

hectares. Large wetland complexes are rare in Quetico, and the only complex of significance is found in the northeast section of the park in the vicinity of the Cache River.

[T. van Dyk]

Bogs occur where the surface layer of peat is raised above the level of contact with groundwater, and consequently the rooting zone of the vegetation is acidic and nutrient-poor. In Quetico, bogs develop in bedrock depressions, as islands in larger peatlands, and other low-lying sites where the groundwater flow is disrupted. Bogs are most common on the glaciolacustrine deposits where finer glaciolacustrine soils impair groundwater flow.

Bog communities have few plant species. Treed bogs are characterized by black spruce, Labrador tea, a few species of sedges, and sparse three-leaved false Solomon's seal over a carpet of *Sphagnum*. Open bogs are less common than treed bogs and are found in wetter portions of larger bog complexes and on some lakeshores above the level of seasonal flooding. They are dominated by *Sphagnum* mosses, bog cranberry (*Vaccinium oxycoccos*), leatherleaf (*Chamaedaphne calyculata*), and other ericaceous shrubs. Three-leaved Solomon's seal, roundleaf sundew (*Drosera rotundifolia*), and cottongrasses (*Eriophorum spp.*) are also found at low cover.

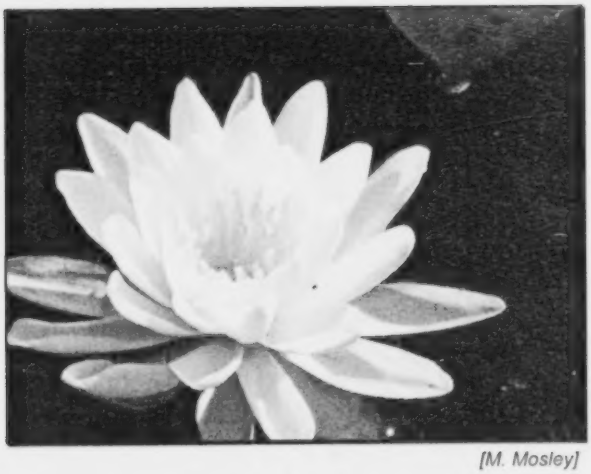
Like bogs, fens are peat-forming wetlands and therefore are dominated by *Sphagnum* species. Because fens receive nutrients from ground water and runoff, fens are less acid and have more species present. Shore fen communities are the most common fen in Quetico. They occur as floating mats in sheltered bays of lakes, and often grade to poor fens away from the lake influence. In early successional stages, slender sedge is often co-dominant with *Sphagnum* species. Common herbaceous species associated with fens in Quetico include pitcher plant (*Sarracenia purpurea*), bog cranberry, slender cottongrass (*Eriophorum gracile*) and hare's-tail cottongrass (*Eriophorum vaginatum*).

Shrub-dominated shore fen is found in slightly drier environments, and is dominated by dwarf birch, sweet gale (*Myrica gale*), leatherleaf, bog rosemary (*Andromeda polifolia*), bog laurel (*Kalmia polifolia*), and shining willow (*Salix lucida*), with alderleaf buckthorn (*Rhamnus alnifolia*) occurring occasionally. Lake-bank sedge (*Carex lacustris*) and beaked sedge (*Carex rostrata*) are common sedge species.

Treed fen communities are usually dominated by tamarack and black spruce, and can be found in wet depressions and are also associated with shore fens but are located farther away from shore.

Thicket swamps and meadow marsh are most commonly found on the floodplains of small streams and on pond systems with a history of beaver activity. Thicket swamps are also found around the periphery of open peatlands, often in the lagg zone at the edge of uplands where mineral-rich surface water or groundwater is present. Meadow marshes are typically dominated by blue-joint grass on mineral soils and tall sedges on organic deposits. Thicket swamps in Quetico are dominated by speckled alder (*Alnus incana*), and are often co-dominant with Bebb's willow (*Salix bebbiana*) and slender willow. Blue-joint grass and sedges are often associated with this community. In richer thicket swamps in the park, shining willow and balsam willow (*Salix pyrifolia*) can be found.

Rich marsh communities in Quetico are confined to estuaries and slow-moving streams where sedimentary organics have accumulated, and are most common in areas of the park where calcareous soils are present. Nutrient–poor waters limit the development of submergent communities elsewhere. Typical submergents include water milfoils (*Myriophyllum spp.*), pondweeds (*Potamogeton spp.*), and common bladderwort (*Utricularia vulgaris*). Common emergent species on wave-washed sandy lakeshores include hardstem bulrush (*Scirpus acutus*) and marsh spikerush (*Eleocharis smallii*).



[M. Mosley]

Rock Barrens, Cliffs and Talus Slopes

Rock barrens are most abundant in four areas of the park, including Basswood, Quetico, Iron and McAree Lakes, and are also scattered throughout the park. These sites are subject to high temperatures and severe drying during the growing season. The plant communities are therefore species-poor and dominated by drought-resistant plants such as velvet-leaved (*Vaccinium myrtilloides*) and lowbush blueberries (*Vaccinium angustfolium*), rusty woodsia (*Woodsia ilvensis*), fringed bindweed (*Polygonum cilinode*), pale corydalis (*Corydalis sempervirens*), bristly sarsaparilla (*Aralia hispida*), and *Cladina* lichens.

Stunted jack pine is also common. In the western section of the park, sweet fern (*Comptonia peregrina*) is commonly encountered in these communities, and on metasedimentary and metavolcanic rock, three-toothed cinquefoil (*Potentilla tridentate*) is found.

Blueberries

Cliffs are found throughout the park and are most abundant along the Man Chain Lakes and adjacent lakes where a major fault line is present. Other cliffs are found throughout the park and are also abundant in the vicinity of Kashipiwi, Agnes and Ottertrack Lakes. The calcareous cliffs associated with the greenstone belt are often dominated by an orange lichen (*Xanthoria elegans*), which is an indicator species of calcareous bedrock. The granite cliffs in the park often share similar species as rock barrens, with rock polypody (*Polypodium virginianum*), rusty woodsia, and *Cladina* lichens often found on ledges, with fragrant cliff fern (*Dryopteris fragrans*), rock tripe (*Umbilicaria vellea*), and crustose lichens typical on vertical faces.

Large talus slopes are not very common in the park. Talus slopes have been located on Kashipiwi and Slate Lake. The vegetation on talus has not been inventoried in the park, although poison ivy and alum root are found at the base of the talus slope located on Slate Lake in two distinct ecological niches.

Significant Vegetation Communities

A number of significant communities are found in Quetico. These communities are of interest for a number of reasons. Some of the communities are biologically diverse, contain high levels of rare species, or are of value to the Natural Heritage Education Program. Some of these communities include:

Red and White Pine Communities

Large stands of old growth red and white pine are rare in Quetico. The majority of stands occur along shorelines or as small inclusions in larger forest communities. Two significant stands are known to occur in the park and both have been subjected to low intensity fire. The largest stand of red pine occurs in the vicinity of McNiece Lake and Shan Walshe Lake, where a prescribed fire occurred in 2006. The other significant stand in the Camel Lake area is dominated by white pine although red pine is an important component. Some of the white pine trees are over 250 years old, and three low intensity fires have been through this area, two of which have occurred in the last 40 years. These forest communities are significant for their fire research and natural heritage appreciation values.

Eastern White Cedar Communities

Extensive stands of eastern white cedar are largely absent from the majority of the park, but can be found on greenstone bedrock in the southeast corner of the park. Many of these communities are significant as old growth features. One significant old growth eastern white cedar community is found on Emerald Lake. Some of the largest cedar trees in the park are found here, with diametres up to 100 cm. Although no tree cores have been taken from this stand, the trees may be up to a thousand years old based on habitat and size. Associated ground flora includes false Solomon's seal (*Maianthemum racemosum*), spikenard, dwarf horsetail (*Equisetum scirpoides)* and blunt-leaved orchid (*Platanthera obtusata*).

Another significant eastern white cedar community is located near Belaire Lake. This community is a pure cedar stand situated in a depression on metamorphic bedrock. Two southern species found here are jack-in-the-pulpit (*Arisaema triphyllum*) and blunt-leaved orchid, both of which are abundant here but locally rare.

Hardwood Forest Communities

A rich trembling aspen community on clay soil is found on Wolseley Lake. Because deep pockets of clay are rare in Quetico, the floristic diversity at this site is locally significant. Components of the community are Saskatoon berry (*Amelanchier alnifolia*), black snakeroot, white rattlesnake-root (*Prenanthes alba*) and purple oat grass (*Schizachne purpurascens*).

Two forest communities that contain large red maple have also been identified. In the area between Poobah and Berniece Lakes, the forest community is dominated by white birch and trembling aspen with an abundance of large red maple with diameters exceeding 20 cm. Pure stands of red maple are found in the vicinity of Glacier Lake, where the red maple stands are smaller inclusions within a trembling aspen forest.

These hardwood forests are rare in Quetico and have a high value for education and research purposes. These forest communities may become more abundant on the landscape as climate change affects the forest composition of Quetico.

Mixedwood Forest Communities

A significant white pine and yellow birch forest community exists along the portage between Lindsay and Cache Lakes. Yellow birch is locally rare in the park, and can only be found throughout the park as minor inclusions in other forest types. This is the best and largest example of this community type found in the park to date. This is also most likely an old growth site, as the white pine trees have diametres up to 120 cm and the yellow birch up to 50 cm.

Red oak is a hardwood species that is locally significant. In the park it is found in mixed forest communities, usually growing in association with red pine. Red oak is fairly abundant along the Maligne River and in the red pine stands in the Shan Walshe Lake area.

Open Wetland Communities

A number of bog communities in Quetico support locally rare orchid species. Swamp pink orchid and rose pogonia have both been documented at two bogs in the vicinity of Bearpelt Lake and Star Lake. Walshe (1980) noted that the Bearpelt Lake bog is significant as every stage of bog development can be found here.

Rich marsh communities are rare in Quetico. Bearpelt Creek Marsh is an extremely rich marsh and contains the only local occurrence of pickerel weed (*Pontederia cordata*). Numerous other aquatic plants are also present. Rich wetland communities are important for the high level of biodiversity present, and are also important moose aquatic feeding areas and provide important habitat for waterfowl.

As stated above, the Cache River wetland complex is significant due to the deep glaciofluvial outwash and alluvial deposits of sand and gravel. Large wetlands are rare in Quetico, and additional inventory work needs to be undertaken in this area to determine the level of significance.

Shoreline Communities

Significant open shoreline communities that support prairie species exist along Lac La Croix in Martin and Rice Bay, and on Iron Lake. Locally rare freshwater cordgrass is generally found growing close to shore, with big bluestem growing higher on the shore in drier soils. One location can be found just outside of the park on Lac La Croix on an island where the provincially rare field sedge (*Carex conoidea*) is located.

These communities have not been well documented in Quetico, and it is unknown if any of these communities would be classified as prairie and/ or savannah. Prairie and savannah communities are extremely rare in the province and ranked S1[6] by NHIC. Additional field work is necessary to document these communities and determine if prairie and savannah communities exist or are considered prairie remnants.

Floodplain Communities

The physiography of the Wawiag and Cache River floodplains are extremely rare in Quetico and northwestern Ontario. Deep glaciofluvial outwash and alluvial deposits of sands and gravels were deposited here as glacial Lake Agassiz occupied the area. In later, quiet-water times of the lake, silts and clays were periodically deposited in association with the nearshore and outwash sediments, creating an extremely fertile alluvium.

The floral diversity of the Wawiag River floodplain is perhaps the higher than anywhere else in Quetico, with a high number of southern and western species present. Near the mouth of the Wawiag at Kawa Bay, a silver maple community with white elm is found on the narrow levee. Fringed loosestrife (*Lysimachia ciliate*) and sessile-leaved bellwort (*Uvularia sessilifolia*) are abundant in the herbaceous layer. Openings within this forest community are dominated by a dense shrub layer. Hawthorn spp. and chokecherry (*Prunus virginiana*) are co-dominant, with nannyberry (*Viburnum lentago*) and highbush cranberry (*Viburnum trilobum*) common associates. Hops are also present at this site, found growing on the upright shrub species. Locally rare herbaceous species found in this forest community include smooth carrion flower (*Smilax herbacea*), ostrich fern (*Matteuccia struthiopteris*), and cow parsnip (*Heracleum lanatum*).

Within Kawa Bay, the provincially rare red-disked water lily (*Nuphar rubrodisca*) is abundant, growing in association with softstem club-rush (*Schoenoplectus tabernaemontani*), river club-rush (*Bolboschoenus fluviatilis*), and narrow-leaved floating burreed (*Sparganium angustifolium*).

Farther upstream from this site at the Mack Creek junction is a white elm and red ash community with Manitoba maple (*Acer negundo*) occurring as a minor component. Wild ginger (*Asarum canadense*) is found in this community and it is the only one of two known location of this species in the park. The other location is located on a tributary of the Wawiag.

The Cache River floodplain has not been inventoried to date. Additional botanical work needs to be undertaken to determine the significance of this floodplain community. The Cache River is also significant as it is the only large wetland complex in Quetico.

A number of significant floodplain communities exist along the Namakan River. A red ash - silver maple stand with bur oak can be found along the shoreline. Herbaceous flora associated with this community include: poison ivy, royal fern (*Osmunda regalis*), small sundrops (*Oenothera perennis*), and sand cherry (*Prunus pumila*). Located behind the red ash - silver maple community is a trembling aspen – white elm community with a large component of basswood, bur oak and red maple. Associated with this community are many southern herbaceous plants including: sessile-leaved bellwort, carrion flower, false Solomon's seal, jack-in-the-pulpit, downy yellow violet (*Viola pubescens*) and alternate-leaved dogwood (*Cornus alternifolia*).

Cliff Communities

Provincially rare basic cliff communities are found along the Man Lakes Chain, Emerald and Ottertrack Lakes and on a tributary of the Wawiag River. Other basic cliffs may exist in the park, but have not been reported to date. The *Basic Open Cliff Type* is provincially rare and ranked S3S4 (Bakowsky 2002).

Most of the basic cliffs in the park are covered in the calcium loving orange lichen *Xanthara elegans*, making identification of these cliff types quite easy. The north-facing Emerald Lake cliff community has a cooler than normal microsite exists that supports many arctic disjunct species including smooth cliffbrake (*Pellaea glabella*), encrusted saxifrage (*Saxifraga paniculata*), smooth woodsia (*Woodsia glabella*), as well as two provincially rare species, limestone oak fern (*Gymnocarpium robertianum*) and snowy cinquefoil (*Potentilla nivea*). Maidenhair

[6] The Natural Heritage Information Centre (NHIC) compiles, maintains and provides information on rare, threatened and endangered species and spaces in Ontario. The NHIC assigns subnational ranks (S-Ranks) for species and vegetation communities in Ontario. These range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario).

spleenwort (*Asplenium trichomanes*) is also found at this location, and is only one of two known locations in the park. The other location is at a cliff found at the narrows on Agnes Lake, where the provincially rare limestone oak fern is also found.

Disjunct northern and western plant species have probably persisted at these cliffs for thousands of years. Since deglaciation, the surrounding vegetation has undergone drastic changes, while tundra and prairie plants were able to persist in open cliff habitats as the surrounding landscape became forested (Bakowsky 2002).

Ottertrack Lake cliff [M. Mosley]

Forest Disturbance

Natural disturbance is an important factor influencing the forest ecology of Quetico. Although wildfire is now an accepted disturbance in maintaining these systems, wind throw, insect and disease outbreaks are also important factors in shaping the forest communities and mosaics of the park.

Fire History

Fire is integral to the health of the park ecosystem, and each year a number of (mostly) lightning-caused fires are allowed to burn within the park, in accordance with Quetico's Fire Management Plan. In the absence of natural fire, nutrient cycles may become impeded by incomplete decomposition of forest litter and humus. Fire is an extremely rapid form of decomposition, releasing nutrients for plant growth, and allowing germination of fire-dependent, shade-intolerant species such as jack pine. Occasionally, there are fires that threaten human health and safety, as well as property and timber adjacent to the park, and these fires require suppression efforts.

Fire has played a major role in maintaining and perpetuating the Quetico ecosystem. Approximately 90% of the forest communities in the park are comprised of pioneer species (jack pine, red pine, white pine, aspen and white birch) and are generally identified as being fire originated communities. The fire regime of Quetico consists of numerous small fires and few large fires, however, large fires account for most of the area burned. The fire cycle of Quetico is estimated to be between 70 - 80 years, based mainly on fire history studies completed in by Heinselman (1971) in the BWCAW and in Quetico by Woods and Day (1977) (Figure 26).

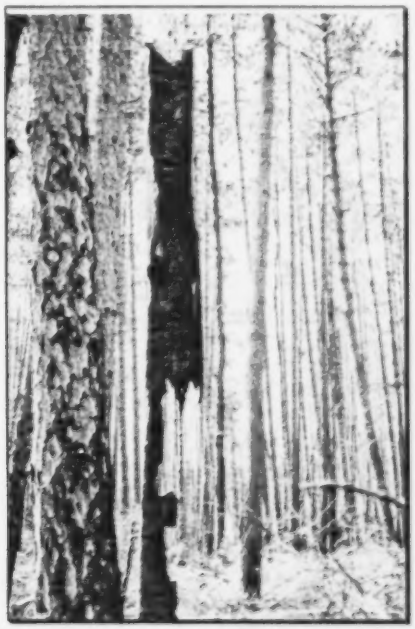
Forest fire in Quetico [L. Solomon]

In the last 86 years, only 25% of the park has burned. As a result of fire suppression, the natural fire cycle of Quetico has drastically increased from approximately 75 years to 298 years (Solomon 2007). To once again reach the natural fire cycle, the amount of area burned each year must substantially increase.

A fire ecology study was undertaken in Quetico in a 97 078 ha area known as Hunter Island located in the southwest section of the park (Woods and Day, 1977). The study found that between 1860 and 1939, 75% of the study area was burned (Figure 26). Much of the area burned in this period was due to an exceptionally dry year in 1936 resulting in large wildfires. While fire suppression techniques were being developed over the next 20 years (1920-1940), an additional 17% of the area burned. In the 35 years that followed, from 1940 to 1975, the area burned was drastically reduced to only 4% of the study area.

From 1920-2006, a total of 119 405 ha of the park burned. Most of the area burned is attributable to two large wildfires, one occurring in 1936 (65 258 ha), and another large wildfire in 1995 (25 085 ha) (Figure 26). See Figure 19 for satellite imagery of recent fire activity both within the park and nearby.

Fire suppression in the park began in the 1920s, and continues to this day. Suppression techniques became more effective over the years, mainly eliminating slow-spreading, low intensity fires. The effects of fire suppression have resulted in older forests with an understory of fire-sensitive, shade-tolerant species such as balsam fir, with an accompanying decrease in habitat diversity and wildlife dependent upon early and middle successional stage forests.



Burned-out tree in Fire 141 area [M. Mosley]

Quetico Provincial Park Fire Management Plan

The Quetico Provincial Park Fire Management Plan was approved in 1998. The plan establishes a Prescribed Natural Fire Zone in which natural fires are allowed to burn to meet management objectives, and guides the use of prescribed burning to reduce hazards and meet management objectives. The plan allows fires to burn within a certain area of the park, within a specific prescription. Since 1998, a total of 203 fires have burned, with 126 being within the Prescribed Fire Compartment. To date, several prescribed burn operations have helped to reduce the hazards associated with large blow down areas in Quetico Provincial Park, and several fires have received a monitored response. The Quetico Provincial Park Fire Management Plan has the following management objectives:

- Protect park visitors and prevent socio-economic disruption.
- Enable the ecological role of fire as an agent of disturbance for the maintenance of ecosystems and critical habitat.
- Promote a "naturalness" objective to approximate a natural forest and wildlife habitat condition.
- Minimize loss or damage to Provincial Park property, infrastructure and structures.
- Minimize impacts of prescribed fire programs on adjacent land users and communities through proper planning and sound decision-making.

Since the implementation of the Fire Management Plan in 1998, a total of 3 400 ha have burned within the park with a total of 2 700 ha attributable to prescribed fires.

The 1995 fire season

The hot dry summer of 1995 led to the most recent major fire event. On August 10 Fire 141, in the south east of Quetico, began with a lightning strike. High winds fanned the flames to an area 1 500 ha in size by the next day, and by August 14 reached 3 000 ha in size. The rate of spread was recorded up to a rate of 50 m per minute, with burning debris being thrown ahead of the fire to a distance of 500 m. At its peak, almost half the park was closed to travel and a portion of the Dawson Trail Campground had to be evacuated. By August 25, the fire covered an area of 25 085 ha, the second largest single fire in Quetico's recorded history.

Wind throw

Small, localized blow downs are evident throughout Quetico. A number of large blow downs have occurred in the park as well, the most notable being the Pines blow down in 2003 on Pickerel Lake that was 650 ha in size, and the 1999 blow down that spanned the international border, affecting an area of 161 000 ha in total size, 10 000 ha of which were in Quetico.

The 1999 blow down

On July 4, 1999, one of the largest blow down events ever recorded in North America hit northern Minnesota and a smaller area in Ontario with heavy rain and straight-line winds.

July 4, 1999 was a hot, muggy day with temperatures almost reaching 38°C. A cold front swept into the area. Typically this mix creates a thunderstorm, but on this occasion it produced a storm so powerful it pulled down winds from six kilometres above the earth's surface. The sudden, straight-line winds or *derechos*[7] that were generated were estimated at 128 to 160 km per hour.

In the United States, the storm affected approximately 192 961 ha (16 % of the Superior National Forest) with blow down including approximately 149 736 ha inside the Boundary Waters Canoe Area Wilderness. The BWCAW sustained the heaviest damage in a line from Ely to the end of the Gunflint Trail. This swath of blow down is approximately 48.27 km in length and up to 19 km wide.

In Canada this storm affected approximately 11 000 ha of forest along the southern boundary of Quetico from North Bay on Basswood Lake through the south ends of Agnes and Louisa lakes through to Knife, Emerald and Plough lakes. The blow down area continued to the west of the park through Northern Lights Lake and Arrow Lake and sporadically as far east as Kakabeka Falls Provincial Park.

This blow down killed many trees and led to an immense amount of dry wood piled on the forest floor. This buildup of fuel increased the risk of catastrophic wildfire. Both the Superior National Forest and Ontario Parks responded with restricted fires zones (RFZs) prohibiting campfires and requiring the use of cook stoves by canoeists in the affected areas for several subsequent operating seasons. Both agencies have used prescribed burn to reduce the fuel loads in the border area. Quetico's prescribed burns included the October 2000 Emerald Lake burn and the 2004, 2005 Pickerel Lake (The Pines) burns.

The 2003 Pines microburst[8]

On July 6, 2003 a severe weather event hit the northeastern sector of the park. While not a large blowdown, it was significant in that the area it affected holds tremendous cultural significance and is well-known to visitors to Quetico. Areas north of the park were also affected, but The Pines on Pickerel Lake sustained the worst damage. The mighty red pines that stood at The Pines were flattened and laid down like matchsticks. Approximately 650 ha of forest were affected in the park, with 550 ha of that occurring in and around The Pines area. It was determined that this was the result of a microburst, a severe downdraft from a thunderstorm with an outward spread of damaging winds, which may have reached as much as 240 kilometres per hour.

Insect and Disease

Jack Pine Budworm and Spruce Budworm are two insect species that are ecologically important to forest succession in Quetico. Both budworm species are always present in Quetico; however, periodic outbreaks do occur, causing extensive defoliation death from repeated budworm damage and poor forest health. Budworm outbreaks also cause changes in tree species composition, tree age class distribution, tree density and understory characteristics. A large Jack Pine Budworm outbreak occurred in 2006, and will likely continue for a few years. Although budworm outbreaks are part of a natural disturbance regime, increasingly warmer weather may cause an increase in the frequency of severe outbreaks. Cold winters keep budworm numbers in check, but a warming trend resulting in

[7] Literally meaning "straight on," a **derecho** describes a widespread convective windstorm with a complex of thunderstorms that develop into a long-lived squall line with straight-line winds. The area may extend for hundreds of miles along the path of the storm.

[8] Microburst is a severe downdraft (downburst) from a thunderstorm which includes an outburst of potentially damaging winds on or near the ground. If the diameter of the downburst is less than 4 km, it is called a microburst. Microburst winds may rotate, but differ from a tornado in the respect that microbursts descend and spread outward. Tornado winds converge and rise.

less severe winters is diminishing this natural limiting agent.

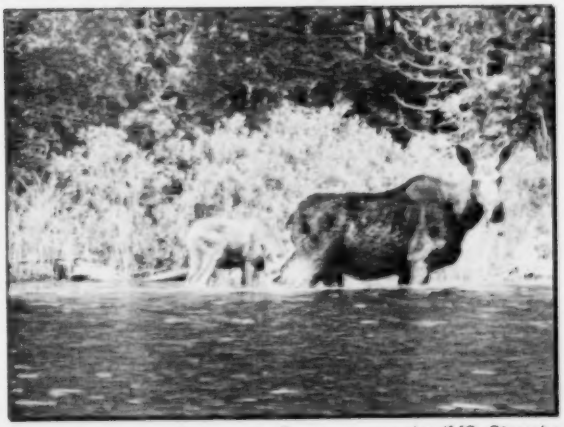
Forest tent caterpillars are also a native, ecologically important insect species in Quetico. In Quetico the preferred host species is trembling aspen. During epidemics, severe defoliation will occur but in most cases the tree will survive and grow a second set of leaves in five to six weeks. Although the caterpillar does not kill the tree it may weaken it and make it susceptible to other diseases. Severe outbreaks tend to last three to four years.

White pine blister rust is an invasive fungal disease that was first discovered in North America in 1897 in Maine. By 1915 blister rust was discovered in Minnesota and by the 1920s it had invaded the BWCAW. The host species for blister rust are currants and gooseberries (Ribes spp.), and white pine trees cannot become infected without the presence of Ribes spp. Although it is believed to have an impact in Quetico (Ahlgren 1984), blister rust is more of a concern in plantations and cutover areas. White pine stands in the park where fires have occurred do appear to be regenerating. It is more likely that fire suppression and logging have had a greater negative effect on the regeneration of white pine in the park than blister rust.

4.3.2 Wildlife

Mammals

Forty-three mammals have been recorded to date in the park, representing 61% of Ontario's mammal list (excluding non-native and marine mammals). Because of the relatively large size of Quetico Provincial Park and its position adjacent to the BWCAW, the combined protected area is able to support populations of species which require a relatively large home range and/or large portions of contiguous habitat. Such species found in Quetico include black bear (*Ursus americanus*), marten (*Martes americana*), and moose (*Alces alces*). Other large mammals found in Quetico include gray wolf (*Canis lupus*) (also known as the timber wolf), coyote (*Canis latrans*), and white-tailed deer (*Odocoileus virginianus*).



Cow moose and calf [C. Stromberg]

White-tailed deer populations are increasing in the park, and will most likely continue to grow as climate change creates more favourable conditions for deer. Gray wolf numbers also appear to be on the rise, especially in the western and southern portions of the park where white-tailed deer numbers appear to be highest.

A number of other large mammals can be found in the park but are at the northern limit of their range and occur at low densities, including raccoon, fisher, porcupine and bobcat.

Moose surveys were conducted in the park until 2002, and densities averaged approximately 0.5 moose per sq km, slightly higher than the surrounding area. The age structure was similar both within and outside of the park, with the percentage of bulls being slightly higher in the park. Beaver surveys have also been conducted to determine trapper quotas.

Quetico Provincial Park contains the typical suite of small mammals for the area. A number of shrews, moles, bats, squirrels, voles, mice, and weasels can be found throughout the park. These include the northern short-tailed shrew (*Blarina brevicauda*), star-nosed mole (*Condylura cristata*), little brown bat (*Myotis lucifugus*), least chipmunk (*Tamias minimus*), woodchuck (*Marmota monax*), woodland jumping mouse (*Napaeozapus insignis*), meadow vole (*Microtus pennsylvanicus*), southern bog lemming (*Synaptomys cooperi*), red-backed vole (*Clethrionomys gapperi*), river otter (*Lutra Canadensis*), and marten (*Martes americana*). Many of these are frequent, and sometimes unwanted, visitors to campsites, drawn to poorly secured food packs and food scraps. The red squirrel

(*Tamiasciurus hudsonicus*) and deer mouse (*Peromyscus maniculatus*) are particularly adept at getting into even the most tightly wrapped provisions. Bats can be seen flying around at dark, feeding on the assortment of insects, especially mosquitoes, which Quetico offers in abundance.

In the southern half of the park, the red squirrel and its major predator, the marten, are the most characteristic animals. Other species include mink (*Mustela vison*), lynx (*Lynx canadensis*), red fox (*Vulpes vulpes*), and snowshoe hare (*Lepus americanus*).

In sectors of richer soil in the park, especially the metasedimentary and greenstone bedrock areas, the Steep Rock Moraine, alluvial floodplain soils and in pockets of lime-rich lacustrine clay, dense thickets of young aspen and birch, hazel, raspberry, willow, mountain maple and mountain ash provide important habitat for moose and beaver - which, in turn, sustain their major predator, the gray wolf.

Several mammal species are no longer present within the park. These include woodland caribou (*Rangifer tarandus caribou*), eastern elk (*Cervus elaphus canadensis*), eastern cougar (*Felis concolor couguar*), American badger (*Taxidea taxus*), and the grey fox (*Urocyon cinereoargenteus*).

Woodland caribou were once the dominant herbivores in this area, with a historic range extending south past the Superior National Forest in Minnesota. Woodland caribou were extirpated from the area in the 1920s. This species is listed as *threatened* by COSEWIC[9] and COSSARO[10].

Eastern elk were once common across almost all of Ontario, including Quetico. The eastern elk became extinct in the Province in the early 1800s. An antler fragment was found in Pickerel Lake in 1926. Elk were also introduced into the Superior National Forest of Minnesota in 1914 or 1915, and on at least one occasion some members of this herd were seen in Quetico (Cahn, 1937). The eastern elk is listed as *Extinct* by COSSARO.

The eastern cougar has also been reported in Quetico, although none of the reports have been substantiated. Historically, the eastern cougar occurred in Quetico, most likely until late in the twentieth century when the species became extirpated from much of eastern North America. This species is listed as *Data Deficient* by COSEWIC and as *Endangered – Regulated* by COSSARO.

Birds

As a result of Quetico's transitional character, discussed above in the context of its climate and vegetation, an overlapping of typically northern, southern, eastern and western species of birds occurs. A total of 222 birds have been recorded in Quetico. Of this total, 122 are confirmed to be breeding in the park. Some representative species include: common raven (*Corvus corax*), gray jay (Canada jay or whiskyjack) (*Perisoreus canadensis*), black-backed woodpecker (*Picoides arcticus*), black-capped chickadee (*Parus atricapillus*), great gray owl (*Strix nebulosa*), spruce grouse (*Dendragapus canadensis*) and many species of wood warblers, the Nashville (*Vermivora ruficapilla*), magnolia (*Dendroica magnolia*) and mourning (*Oporornis philadelphia*) warblers being among the most common. Pine (*Pinicola enucleator*) and evening grosbeaks (*Coccothraustes vespertinus*), common redpoll (*Carduelis flammea*), white-winged (*Loxia leucoptera*) and red crossbills (*Loxia curvirostra*), pine siskin (*Carduelis pinus*) and purple finch (*Carpodacus purpureus*) are some of the very few bird species found in Quetico in the winter months. Birds at the northern limit of their range include the black-billed cuckoo (*Coccyzus erythropthalmus*) and indigo bunting (*Passerina cyanea*) while birds common to the western prairies such as the yellow-headed blackbird (*Xanthocephalus xanthocephalus*) and western meadowlark (*Sturnella neglecta*) have been sighted.

[9] The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada, and officially designates species at risk as Extinct, Endangered, Threatened, or of Special Concern.

[10] The Committee on the Status of Species at Risk in Ontario (COSSARO) reviews the COSEWIC status reports and assessments for those species that occur in Ontario. COSSARO makes recommendations to the Ministry of Natural Resources (MNR) on the appropriate provincial status of the species (Extinct, Extirpated, Endangered, Threatened, or of Special Concern).

Quetico is known for its populations of bald eagle (*Haliaeeutus leucocephalus*) and osprey (*Pandion haliaetus*), seen soaring above the water. Both species nest regularly throughout the park and are frequently observed by canoeists. All three accipiter species in Ontario are found in Quetico, including Cooper's hawk (*Accipiter cooperii*), northern goshawk (*Accipiter gentilis*) and sharp-shinned hawk (*Accipiter striatus*).

Bald Eagle [C. Martin]

A large percentage of the recorded species, including almost all of the smaller passerines such as warblers, sparrows and thrushes breed within the park. Of 25 warblers recorded, 21 are confirmed breeding in the park. In mid-June, the forests are alive with the sounds and activities of birds nesting and rearing their young. By mid-August, young birds are out of the nest, and southward migrational movements begin.

Significant populations of waterfowl do not occur within the park because of the lack of suitable breeding habitat. Common merganser (*Mergus merganser*), common goldeneye (*Bucephala clangula*), and isolated pairs of black duck (*Anas rubripes*) and mallard (*Anas platyrhynchos*) are the most common breeding species. Common loons (*Gavia immer*) breed in the park, and their distinctive call can be heard throughout the park. Often large groups of loons can be seen "rafting up" in late summer as they prepare to fly south. Due to the scarcity of marshes in Quetico's rocky environment, the American bittern (*Botaurus lentiginosus*), pied-billed grebe (*Podilymbus podiceps*), sora rail (*Porzana carolina*) and other wetland species occur only sporadically. The American white pelican (*Pelecanus erythrorhynchos*) has been recently observed in the park, although breeding has not been confirmed. Fifteen pelicans were observed on French Lake in late May of 2006.

Mallards, Pickerel River [M. Mosley]

Four non-native species have been identified, all within the Dawson Trail Campground. None of these species have been observed breeding. Two of these species are considered invasive in Ontario; the brown-headed cowbird (*Molothrus ater*) and the European starling (*Sturnus vulgaris*).

Reptiles and Amphibians

The relatively short summers and the long, cold winters of the Quetico area limit the number of species of reptiles and amphibians. Only eight species of frog, one species of toad and two species each of salamander, snake and turtle have been recorded within the park.

There are only three reptiles found in the park, including the snapping turtle (*Chelydra serpentina*), the western painted turtle (*Chrysemys picta bellii*), and the common gartersnake (*Thamnophis sirtalis*), and likely the red-bellied snake (*Storeria occipitomaculata*) as it has been recorded in the Atikokan area. The western painted turtle is a subspecies of the painted turtle, and in Ontario this subspecies is only found in a narrow band in Northwestern Ontario along the Minnesota border. This population may prove to be an important source of genetic material as the climate continues to warm and affect more southerly populations of the western painted turtle. Turtles can often be seen on a log basking in the sun in a small pond or river, while snakes are often seen lying in a patch of sun on a trial or portage, typically from mid-morning to early afternoon.

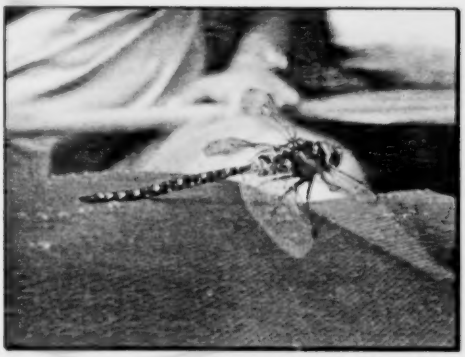
Western painted turtle [M. Mosley]

Amphibian diversity is higher, with 13 amphibians found in the park. This includes two species of salamander, the eastern red-backed salamander (*Plethodon cinereus*) and the blue spotted salamander (*Ambystoma laterale*). Due to the secretive nature of salamanders, it is unknown how common these two species are in the park. Salamanders often conceal themselves in damp soil in the forest, and can be found in moist environments, such as under logs and stones. There are also eight species of frogs and one toad species found in Quetico. These include the northern leopard frog (*Rana pipiens*), wood frog (*Rana sylvatica*), boreal chorus frog (*Pseudacris maculata*), and spring peeper (*Pseudacris crucifer*). The spring peeper is the loudest animal on the planet for its size, yet most never see it because it is so small. The spring peeper's distinct high pitched peeping can be heard throughout Quetico Provincial Park in spring and summer.

Invertebrates

Little is known about the terrestrial and aquatic insects of Quetico. Detailed inventories have not been conducted to date, however, limited studies of with butterflies and moths have been done. The dragonflies and damselflies have been largely ignored, and an effort to inventory these was initiated in 2006.

While little is recorded about the insects of Quetico, visitors will quickly realize that this does not reflect the actual presence of insects. Early spring and summer brings black flies and mosquitoes, the bane of the outdoor enthusiast on a windless day. Campers will also notice the abundance of spiders, ants, flies, and wasps trying to make a home in the tent or steal away with their food. Crickets, cicadas, and grasshoppers can be heard chirping and buzzing on a hot summer's day, and fireflies may be seen glowing in the air at night. Mayflies, stoneflies, caddisflies, dragonflies, and damselflies can all be seen dipping and diving in the air near lakes, rivers, and wetlands. In their nymph and larval stages, they may be seen as beetles swimming in the water, alongside water striders, water boatmen, and other water beetles. Ticks are a common insect in grassy areas in the spring and summer, and walking through these areas likely will result in some unwelcome guests on clothing.



Dragonfly [M. Mosley]

The butterflies and moths of Quetico have been inventoried over the years by numerous park naturalists. A collection of butterflies and moths is housed at the John B. Ridley Research library. Forty-nine species of moths and 31 species of butterflies have been identified to date. Only one species has been designated a species at risk: the monarch butterfly (*Danaus plexippus)*. The monarch is designated as *Special Concern* due to habitat loss on its wintering grounds. No surveys have been conducted in the park to measure population trends for this species, although large numbers are reported yearly by park visitors and staff. One non-native moth species, cabbage white (*Pieris rapae*), has been discovered in the park, although it is not known where this species was located, or when it was last reported.

Very little information is available for the dragonflies and damselflies in the park. Incidental sampling occurred in early August of 2006, and therefore many of the species that are active in spring and early summer were not sampled. The Canada darner (*Aeshna canadensis*) was the most frequently

encountered species. The familiar bluet (*Enallagma civile*) was also sampled quite frequently. Williamson's emerald (*Somatochlora williamsoni*) was captured only once, and this species is ranked as S3.

4.3.3 Aquatic Resources

In order to relate the fish resources of Quetico Provincial Park to those in the remainder of Ontario, it is first necessary to examine the physiographic and climatic features of the area. Of prime importance is the fact that the park, lying within the Precambrian Shield, is characterized by the presence of frequent expanses of bare, granitic bedrock and soils that are predominantly shallow, acidic and sterile. Lakes are numerous in the Shield and many are similar in their physical qualities (deep, generally clear, cold and low in productivity). They contain characteristic species such as lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*) and burbot (ling) (*Lota lota*).

Although Quetico is characterized by a rugged landscape of rock outcrops and a myriad of lakes, it is not typical of the Shield for several reasons. Bedrock in approximately 30% of the park consists of soft, moderately rich metasediments and greenstones, which release nutrients faster and in a form more available to plants than the hard, acidic granite does. Thus, some Quetico soils (and consequently some lakes) are richer than those in Shield areas where bedrock is exclusively granite.

In addition to the ground moraine, several other soil types exist. With the disappearance of glacial Lake Agassiz, isolated pockets of rich lacustrine clay (0.5 m to 10 m thick) are found in valleys and low lying areas. These contributed significantly to the enrichment and partial filling-up of local lakes. A deep glacio-fluvial outwash formation contains sand and gravel deposits in the Wawiag River area.

Lac La Croix, adjacent to the park's southwestern boundary, is situated at the confluence of two drainage systems, one from Windigoostigwan Lake, French Lake, Pickerel Lake and Sturgeon Lake to the north, and the other from the lakes that form the Canada-U.S. boundary such as Saganaga, Knife, Basswood, Crooked and Iron to the east. As a result, Lac la Croix is a veritable catch-basin of dissolved solids of natural origin (clay, silt, minerals) and of human origin (phosphates, nitrates).

[G. and J. McGuffin]

Finally, situated as it is, close to the western border of Ontario, Quetico has a substantially different climate from that in other parts of the Shield. Weather systems originating in the central Great Plains affect the park by producing a somewhat warmer and drier climate with a longer growing season than that of similar latitudes to the east. The cumulative effect of the foregoing factors in Quetico is the presence of some lakes that are somewhat more fertile and, consequently, more productive than are typical Shield lakes.

Lake Characteristics and Hydrological Information

Approximately 21 % (1 010 km^2 or 101 057 ha) of the total park area is comprised of water, with 2 943 lakes, 297 of which are named. A total of 678 lakes are larger than 10 ha, while 2 265 lakes are smaller than 10 ha (Table 3).

Table 3: Size stratified distribution of all lakes and named lakes within Quetico Provincial Park.

Size Category (ha)	All Lakes			Named Lakes		
	Number of lakes	Area (ha)	% of Total Area	Number of Lakes	Area (ha)	% of Total Area
< 4	1 900	2 000	0.42			
> 4 < 10	365	2 400	0.5	8	39	0.01
Sub-total	**2 265**	**4 400**	**0.92**	**8**	**39**	**0.01**
> 10 < 50	442	9 737	2.05	74	2 418	0.51
> 50 < 100	107	7 703	1.62	87	6 420	1.35
> 100 < 500	94	20 923	4.4	94	21 059	4.43
> 500	35	58 294	12.25	35	58 294	12.25
Sub-total	**678**	**96 657**	**20.31**	**290**	**88 191**	**18.53**
Total	**2 943**	**101 057**	**21.24**	**298**	**88 230**	**18.54**

Quetico's physical features and geology have resulted in several lake ecosystem types with respect to fisheries. A survey of 298 QPP lakes indicated

36 % (106 lakes) with cold water characteristics, and 64 % (191 lakes) with warmwater characteristics (Tyhuis 2000). Coldwater lakes are larger on average than warmwater lakes, having a mean area of 665 ha versus 93 ha, respectively. Coldwater lakes have characteristics better suited to lake trout, having steep shorelines dropping into a deep basin (often > 30 m), and dissolved oxygen to the bottom. Warmwater lakes are suitable to bass (*Micropterus* spp.), northern pike (*Esox lucius*) or walleye (*Stizostedion vitreum vitreum)*, generally having more gently sloping shorelines, and shallow basins (< 30 m) with anoxic zones at depth. In trophic terms, coldwater lakes are oligotrophic or nutrient poor, while warmwater lakes tend to be meso- or eutrophic (moderate nutrient levels to nutrient rich). Many coldwater lakes have basins or zones with warmwater characteristics, allowing bass, pike, or walleye to thrive. Very few Quetico lakes are so oligotrophic as to exclude warmwater species.

Fish Communities

A total of 48 fish species have been reported in Quetico. The lakes within the park support fish communities that vary according to local lake characteristics. The broadest classification of these communities is according to coldwater and warmwater habitats (as outlined above) (Figure 27). Coldwater communities can include lake trout, lake whitefish, cisco (lake herring) (*Coregonus artedii*), and burbot. Warmwater communities can include walleye, northern pike, smallmouth bass (*Micropterus dolomieui)*, largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescnes*), black crappie (*Pomoxis nigromaculatus*), rock bass (*Ambloplites rupestris*), lake sturgeon (*Acipenser fulvescens*), as well as sunfish species (*Lepomis spp)* (Crossman 1976).

Most of the fisheries research and monitoring has occurred on lakes that are used by the Lac La Croix Guides Association, and data collection has focused on the major sport fish species. Very little information exists for non-sport fish species and invertebrate populations that comprise other parts of aquatic food webs. Inventory and monitoring efforts may help to provide data in order to gain a better understanding of the composition, structure and function of these populations within the park.

Habitat Availability

Habitat availability is best demonstrated through fish species distribution among Quetico lakes (Figure 8). Of the 297 named lakes studied within the park, only four contain exclusively coldwater species (indicating the presence of only infertile coldwater habitat). 95 lakes contain both coldwater and warmwater species (and therefore both habitat types). A total of 111 lakes contain only warmwater species (Tyhuis 2000). Detailed data on fish presence and thermal classification can be found in the Quetico Fisheries Stewardship Plan Background Information.

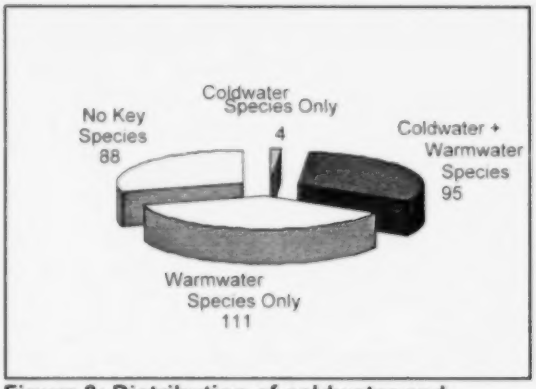


Figure 8: Distribution of coldwater and warmwater fish in 298 named lakes in QPP.

A need for baseline information regarding fisheries habitat has been identified in order to build a fundamental understanding of fish population health. As the goal within Quetico Provincial Park is to protect naturally reproducing fish populations, it is important to gather information on critical fish habitats such as spawning sites, nursery and staging areas, and migration routes. Such information will allow the monitoring and protection of these habitats.

Historical Communities

Quetico has long been known for the quality of its fisheries. Historically, this reputation centred on the abundance of several key species that formed relatively simple lake ecosystems. Lake trout has been the dominant top predator within coldwater habitats, where it coexists with lake whitefish and cisco. Warmwater habitats were historically dominated by walleye and northern pike. Anecdotal evidence also suggests that largemouth bass were native to some park lakes, where they still exist. Lake sturgeon is known to be present in six lakes within the park, and seven lakes in the surrounding area. Very little is known about the size or health of these

lake sturgeon populations.

The diversity of fish species in Quetico are the result of several factors. This includes human-caused introductions, both intentional and accidental, as well as the complex drainage systems that emerged after the last retreat of the glaciers. One possibility for the strong presence of disjunct species in Quetico such as the longear sunfish (*Lepomis megalotis*) and pumpkinseed (*Lepomis gibbosus*) is that 12 400 ago after the retreat of the glaciers, Quetico was covered by glacial Lake Agassiz (Crossman 1976) At that time, Lake Agassiz was connected to the Mississippi drainage system flowing to the south, not to the Red River system flowing north to Hudson Bay (MacKay 1963). More southerly species may have found their way into Quetico at that time, as changes in the drainage systems opened up numerous channels through which aquatic species could redistribute themselves, and then persisted even after the drainage system shifted to the north and were subsequently cut off from the southern populations of fish (Crossman 1976, MacKay 1963).

Exotic Species Introductions

The most notable and widespread species introductions within the park has been smallmouth bass. First recorded in Lac La Croix and the border waters in the 1950s and Pickerel Lake in the 1960s, smallmouth bass are now considered a naturalized species within the park and known to occur in 157 lakes. Although competitive interactions occur between smallmouth bass and other sport fish (particularly walleye), negative impacts would already be realized due to their long-term presence. However, care must still be taken to prevent spread beyond their current range. Rock bass and several species of sunfish may have also been introduced to park lakes along with smallmouth bass, and may also have negative competitive interactions with native species.

Brook trout (*Salvelinus fontinals*) were stocked into two small lakes in the 1960s, but this practice was discontinued and has likely ended their presence in QPP.

Rainbow smelt (*Osmerus mordax*) were introduced into the Atikokan-Quetico area in the 1970s and appeared in Pickerel Lake and Lac La Croix in the 1990s. Rainbow smelt pose a particular threat to native forage communities, as well as to walleye and lake trout populations that use them as forage. Rainbow smelt are known to out-compete native forage fish species, sometimes causing populations of native species such as cisco to crash. Additionally, rainbow smelt contain an enzyme that breaks down thiamine (vitamin B_1) in fish (Fitzsimons 1995, Fisher et al. 1996), which can cause greatly reduced recruitment through early mortality syndrome (EMS).

Black crappie is a warmwater species that poses a great potential risk to native fisheries within QPP. Recorded in 12 park lakes to date, black crappie has the potential to out compete almost all other fish species with which they coexist when in shallow lakes that contain sufficient vegetative cover to protect them from predation (McNeil 1992). Walleye populations are at greatest risk, as young walleye can suffer from both competitive and predatory interactions that greatly reduce recruitment. Fortunately, the fact that many of Quetico's lakes are deep and have minimal vegetated areas would likely minimize the impacts from black crappie.

Several exotic invertebrate species also pose potential threats within Quetico. The spiny water flea (*Bythotrephes cederstroemi*) is a tiny (1 cm long) exotic crustacean which originated in Great Britain and northern Europe. Recorded in the late 1980s in Lake Superior, it has most recently been recorded in Rainy Lake, Lac La Croix and Namakan Lakes, as well as Saganaga Lake and Saganagons Lake on the southeastern boundary of the park. The spiny water flea was probably introduced into inland lakes through recreational boating traffic and contaminated fishing gear. Spiny water fleas collect on fishing lines and downrigger cables, and can be transported in bait-buckets and live wells. It only takes one adult or egg to begin an infestation. As a popular entrance location to the park, there is particular concern for further spread of this species into park lakes along the boundary waters, as it is easily spread by anglers on fishing gear. A monitoring program was initiated in the park in 2006, and lakes along the boundary waters were sampled. No new populations were discovered.

Rusty crayfish (*Orconectes rusticus*) originate in the central United States, and can enter as bait via non-resident anglers. Rusty crayfish out compete native crayfish populations, and can reduce lake and stream vegetation, thereby reducing habitat for many other aquatic organisms. Rusty crayfish have been

recorded in Rainy Lake, Lake of the Woods, and in inland lakes in Minnesota. Rusty crayfish were documented in the park in Basswood Lake at Prairie Portage sometime in the 1990s, and in Saganagons Lake and it is unknown whether this species has spread to other lakes within the park.

It will be important to prevent the introduction or further spread of exotic species in QPP, due to their capability to drastically alter aquatic ecosystems. Fortunately, upstream migration of fish species and other exotic organisms is limited in QPP due to outward flowing currents and steep topography (e.g. waterfalls or rapids). This is an especially important consideration with respect to rainbow smelt, as their spread into other water bodies appears to be restricted for the moment. Unfortunately, the spread of many exotic species is through human movements, and prevention will require ongoing education and enforcement programs.

Productive Capacity of Fish Communities

Lake productivity in basic terms is the biological output of a lake. In fisheries it is described as the amount of fish biomass a lake is capable of producing in a given year, expressed as kilograms per year (kg/yr). Fish production is directly related to the primary productivity within the lake (growth of plant plankton on which the food web is based), the rate of which is a combination of available nutrients, available sunlight, and temperature. Several other factors that influence these primary components include the size and shape of its basin, lake chemistry, soil chemistry and vegetation surrounding the lake, as well as topography.

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Lakes in Quetico have relatively low productivity levels in comparison to other area lakes (QPP mean MEI[11] value of 2 compared to an Atikokan area mean of 5.8, with some Atikokan lakes reaching as high as 20; OMNR unpublished data). Lower MEI may be somewhat compensated for by the fact that the park's climate is generally warmer and drier than the surrounding area, particularly in the southwest area of the park. Furthermore, nutrient input from greenstones and metasediments in some park areas result in higher productivity than that of typical Canadian Shield lakes.

Fisheries Assessment

It is fundamentally important to have a clear understanding about the quality and abundance of resources. A variety of assessment activities have been undertaken to monitor Quetico's aquatic resources, but more widespread monitoring efforts are required to effectively monitor the status and health of fisheries resources.

To determine the status of specific fish populations or communities, more robust and often species-specific indices are used. To date, much of this type of fish population monitoring within QPP has been focused on lakes in the W2 zone. Since 1995, assessment programs have been monitoring the impact of angling effort on fish stocks in the motorized guiding zone. Additionally, Robinson and Brewer Lakes (within the W1 zone) were surveyed to provide a basis for comparison using lakes that are only subject to interior park angling. Unfortunately, this bias towards lakes used for motorized guiding has created a deficit of fisheries information within the W1 zone, and left Quetico without a true control group of lakes with which to make comparative analyses.

In addition to inventory initiatives undertaken at the District and park level, three QPP lakes are part of the Quetico – Mille Lacs Fisheries Assessment Unit (Robinson Lake, Pickerel Lake, and Agnes Lake). These three relatively pristine lakes are used for baseline comparisons in studies that assess the impact of various stressors on the health of lakes in the Northwest Region.

A comparison of walleye abundance in fall walleye

[11] Overall lake productivity is most commonly estimated using the Morphoedaphic Index (MEI), which is calculated as the mean depth of a lake (in metres) divided by the total dissolved solids (TDS) at the surface (Ryder 1965).

index netting (FWIN) catches suggested that QPP lakes generally rank lower in comparison to regional means (Figure 9). Lower than average abundance in certain lakes is attributable to a number of factors, including lake status (oligotrophic, low productivity), species interactions, over-exploitation, and/or variable year class strengths.

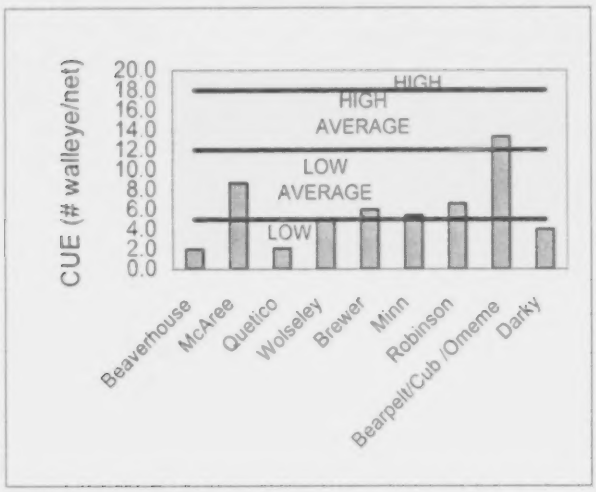


Figure 9: FWIN catch rates for several QPP lakes compared to Fort Frances District quartile values ***(rating levels are indicated by horizontal reference lines)***

Water Management

The QPP Draft Water Resource Management Plan addresses water management needs. It aims to maintain high water quality while minimizing the artificial manipulation of water levels for the benefit of park users and the park fish and wildlife resources. There are only two dams maintained in Quetico located on Pickerel Lake and Sucker Lake. The Pickerel Lake dam passively maintains water levels on this and adjacent lakes, and is unlikely to create substantial fisheries impacts. The Sucker Lake dam is used to actively maintain water levels south of the U.S. border, and is maintained by U.S. authorities.

Water Quality and Contaminants

Baseline water quality has been monitored by the Ontario Ministry of Environment and Energy (OMEE) over time, however, little information is available concerning potential contaminant sources that are present in or outside of the park. As water quality within QPP is of fundamental importance to its fisheries resources, ongoing monitoring initiatives must be considered.

The use of lead fishing tackle (mostly sinkers and jigs) is becoming a topic of concern in a number of Canada's parks and protected areas. For several years the use of lead tackle has been restricted in Canada's national parks, so that its uptake into aquatic ecosystems is limited. Lead is considered to be a major environmental health hazard, and can enter ecosystems through both local (e.g. lead tackle) and atmospheric sources. Consumption of lead tackle may also lead to poisoning of common loons (Sheuhammer et al. 2003).

Common Loon

Climate Change

Lake trout may suffer the greatest consequences of climate change, due to their stringent habitat requirements. It is possible that increased temperatures will decrease the availability of necessary coldwater habitat in some lakes, and eliminate it from others. Lake trout may also suffer from greater competitive interactions with smallmouth bass, as described below.

Walleye populations may see an increase in productivity in certain areas, due to increases in lake productivity associated with temperature. However, in lakes with higher productivity, they may be subject to greater competition from invading warmwater species such as black crappie.

Smallmouth bass and black crappie are likely to benefit from warmer climatic conditions. Warmer water temperatures and productivity would increase their available habitat in warmwater and coldwater lakes, and provide them with increased cover and resources. As well, warmer temperatures would mean increased growth of young fish, leading to greater over-winter survival. Unfortunately, increases

in smallmouth bass would occur at a direct loss to lake trout, and increases in black crappie would impact walleye populations.

Overall, many of the fisheries impacts in relation to climate change are likely to be realized through competitive interactions and community changes, rather than through direct impacts. For this reason, it is even more important to prevent the introduction and further spread of exotic species, as their potential for ecological damage may be increased in the future. It will be important to monitor community changes over time, as well as to integrate the findings of future research in this area.

Fisheries Management

Management actions within Quetico Provincial Park seek to maintain a healthy aquatic ecosystem with high quality recreational activities that are reflective of a fishery that is not stressed. As outlined in the Revised Park Policy 1995, fisheries management should primarily be accomplished through the implementation of limits (catch and/or size) and seasons, in order to allow fish communities to naturally sustain themselves. Such regulations can be established on a periodic basis, and can be applied to individual or numerous lakes as required.

The Quetico Provincial Park Fisheries Stewardship Plan (2006) has been developed to provide management direction for the protection of the ecological integrity of aquatic ecosystems in Quetico Provincial Park, and in turn the high quality fishing experiences associated with them. The plan was developed under the guiding reference of the Revised Park Policy 1995, in association with a number of supporting documents. The management direction works to maintain the spirit of this wilderness park.

Fisheries resources in Quetico are also managed in accordance with the Lac La Croix Agreement of Co-Existence (1994). The goals of this agreement are to protect angling resources within QPP, while minimizing socio-economic impacts associated with restricted access to guiding activities. The implementation policy of this agreement also emphasises the need for fisheries assessment work to monitor the impacts of increased fishing activity associated with guiding in the mechanized guiding zone of QPP.

For more information regarding fisheries management in Quetico Provincial Park, refer to the Quetico Provincial Park Fisheries Stewardship Plan and Background Information (2006).

4.4 Significant Life Science Features

Quetico contains 27 provincially rare species, or 4.5% of the total flora. Four of these species are considered extremely rare, and ranked as S1. The majority of rare plants in Quetico are found on greenstone and metasedimentary bedrock. Because Quetico is located in a zone of transition between the Great Lakes-St. Lawrence and the Boreal forests, many of the rare species found here are either at the northern or southern limits of their range. For example, the snowy cinquefoil (*Potentilla nivea*) is an arctic species that is ranked as S1 and has only been found at one location in the park. The ram's-head lady's-slipper (*Cypripedium arietinum*) is a southern species, ranked as S3, which is located in the eastern section of the park. Due to the close proximity of the prairies, many western species are also found in Quetico. Limestone oak fern (*Gymnocarpium robertianum*) is a western species, ranked S2, which is found only on calcareous substrates.

There are two rare insects found within Quetico: the hoary comma butterfly (*Polygonia gracilis*) and Williamson's emerald dragonfly (*Somatochlora williamsoni*). The monarch butterfly is also a species at risk that has been observed in Quetico. Eighteen rare birds have been observed within the park, including the horned grebe (*Podiceps auritis*), trumpeter swan (*Cygnus buccinator*), and rough-legged hawk (*Buteo lagopus*), although breeding has not been confirmed for any of these sightings. There have been seven bird species at risk reported in Quetico, including the American white pelican (*Pelecanus erythrorhynchos*), prothonotary warbler (*Protonotaria citrea*) and black tern (*Chlidonias niger*). Of these species, only the bald eagle and great grey owl have been confirmed breeding.

There are two fish species at risk, and two rare fish species that occur in the park. Lake sturgeon was recently assessed by COSEWIC, resulting in the Rainy River - Lake of the Woods population designated *Special Concern*. The MNR has not yet assessed this species, but will likely complete its assessment in 2007. No population assessments or spawning studies have been conducted in the park

for this species. It is presently not known if lake sturgeon is resident in the park, although it is likely that resident populations exist in Tanner, Sturgeon, and Russell lakes as well as the Maligne River. Sturgeon have also been reported on Beaverhouse and Quetico lakes (Atatise 2007). Spawning has been observed on a number of rivers in the north-central portion of the park, and a reconnaissance was done in 2005 to determine possible spawning areas.

The shortjaw cisco (*Coregonus zenithicus*) occurs only in Basswood Lake. This species is assessed as *Threatened* by COSEWIC and MNR. There is currently no information known about this population. The silver lamprey (*Ichthyomyzon unicuspis*) and longear sunfish are both ranked as S3 species. The silver lamprey is known to occur in four lakes in the southern portion of the park, and the longear sunfish occurs in nine lakes in the northwest and southern portions of the park.

5.0 CULTURAL HERITAGE

The cultural heritage resources of Quetico Provincial Park are both plentiful and significant, representing major expressions of the Original People of the boreal forest and Canadian Shield and their descendents, as well as Quetico's role and importance to the fur trade period and the exploration of Canada. Quetico's rich archaeological past can be traced to its origins as part of the corridor between glacial lakes Agassiz and Minong through which the earliest inhabitants moved northeast as the glaciers retreated. The boundary waters corridor of Quetico has also been a major transportation route since the earliest times. The co-operation and partnership among the British fur traders, the voyageurs, and Original People was a critical stage in the development of present day Canada, and international co-operation has been integral to the development and preservation of this extraordinary region.

The number of archaeological sites found within the park reflects a high level of prehistoric occupation. The nomadic lifestyle of the first inhabitants, the harsh terrain, and the acidic soils meant that relatively few small and scattered archaeological sites have been located (Dawson 1983, Wright 1995). The sites are often destroyed by rising water levels, invading forests, and acidic soils (Dawson 1983, Wright 1995). As a result, it is likely that many more artifacts may have existed than have been found to date, but were unable to withstand the ravages of time. Many portions of the park have not been explored archaeologically and those that have been surveyed have only been subject to cursory testing and, on rare occasions, limited excavation. As a result, available information about the long period of occupation by aboriginal people is incomplete.

5.1 Paleo-Indian Period (10 000 to 7000 BP)

Until approximately 10 000 years ago, the land north of the present shores of Lake Superior was completely covered by glacial ice (Ministry of Culture [MCL] 1979). Along the ice margins were expanses of open spruce parkland[12] and tundra-like vegetation inhabited by caribou and other species now found only in the far north (MCL 1979). At this time, the ice receded to the northwest and a corridor opened between glacial Lakes Minong and Agassiz, formed by the melting glacial ice (MCL 1979). The area now known as Quetico was vastly different at this time than it is today. The Wisconsin glacier still covered much of northern Ontario as far south as Lake Nipigon, and Lake Minong filled the Lake Superior basin (MCL 1979). The park area became free of glacial ice around 10 000 years ago, and the melting of the glacial ice produced Lake Agassiz which flooded most of Quetico and west into Manitoba (Teller and Thorleifson 1983). The ecological region after deglaciation and the retreat of Lake Agassiz was originally a Lichen Woodland vegetation province, which by 9 000 years Before Present (BP) had changed to a Continental Boreal Forest Province (McAndrews et al. 1987).

[12] The Parkland Vegetation Province represents a transition between the drier Grassland Vegetation Province of the plains and the coniferous forests of the Boreal Forest Vegetation province. Parkland vegetation is a patchwork of forest, prairie and wetlands.

Figure 10: The Lake Superior region 10 000 years ago

Plano Culture

It is not known when the first people inhabited Quetico, but it is believed that people of the Plano culture first entered the Thunder Bay area from the south and west about 9000 years BP, after the glacier and Lake Agassiz retreated (MCL 1979). Paleo-Indian sites have been found throughout the Quetico boundary waters that are associated with Campbell level beaches of Lake Agassiz, between 9000 and 10 000 BP (Drabik 1979). The Plano were big game hunters of large migratory herd animals. Given the environment and settlement patterns, the use of some form of portable water transport (canoes), winter transport (snowshoes/ toboggans) and domesticated dogs/wolves for use in the hunt is likely (Dawson 2004). Stone tools from the Paleo-Indian period have been found at a small number of sites in Quetico, including jasper taconite bifaces and Knife Lake siltstone knives. As well, quarries of Knife Lake siltstone have been discovered on Knife Lake. The number of these sites and the prevalence of Knife Lake siltstone artifacts found in the surrounding area suggest that these quarries played a significant role in the Paleo-Indian economy of the region (Nelson 1992). Due to the lack of radio-carbon dating on artifacts from these early time periods, it is unknown whether it took hundreds or thousands of years for humans to populate this area (Nelson 1999). Quetico may have been inhabited as early as 9500 years ago, and the earliest evidence of human occupation during this time consists of a chert lance head of Agate Basin style found along an old strandline of glacial Lake Agassiz on Pickerel Lake (Fox 1975).

Ten thousand years ago the major large game quarry was likely barren-ground (migratory) caribou. As lake levels dropped a band of vegetation known as the boreal-taiga remained which supported the ungulate population (Dawson 1983). A caribou antler found in the silt at the bottom of Steep Rock Lake north of the park was radio-carbon dated to 9900 BP (Jackson and McKillop 1989), providing evidence of a food source for early inhabitants of the area, although the moderating climate may have already forced barren-ground caribou north before the arrival of the Plano. The diet of the Plano culture likely relied heavily on moose, which would have been abundant at the time, as well as on other wild game including fish and waterfowl, supplemented by small mammals, turtles, and other ungulates (elk, white-tailed deer). As well, berries, seeds, tubers, and other plants were likely important food sources. With the recession of the continental glacier and warming of the climate came lowering lake levels and forests began to emerge from the previous grasslands. The northward migration of the plant and animal communities upon which the Paleo-Indians depended for their existence resulted in the decline of the caribou-hunting lifestyle of the late Plano/Early Shield people in the region, about 7000 BP (MCL 1979).

5.2 Archaic Period (7000 to 1500 BP)

Middle Shield Culture

With a moderating climate, the western section of the region developed into a Great Lakes- St. Lawrence forest by 5000 BP (McAndrews and Manville 1987). Warmer, drier climatic conditions and resulting changes in the distribution of large game and plant communities about 7000 BP stimulated a shift in lifestyle to exploration of small game and plant resources (MCL 1979). Corresponding changes in subsistence technology included a reduction in the size of projectile points (for smaller game), the use of the bow and arrow, the appearance of fishing technology, and the use of unmodified flakes, formerly discarded, whose naturally sharp edges could be used for a variety of tasks (MCL 1979, Dawson 2004). A number of large bifaces found on the quarry sites on Knife Lake are believed to have been from the Archaic period (Nelson 1992). The increased presence of choppers, chipped adzes, and polished stone tools reflect an expanding adaptation to the forest resource base (Dawson 2004). The Archaic culture in this period is thought to have lasted

from 7000 to 3000 years ago (Wright 1972), and consisted of the Middle Shield people (6000 to 3000 BP) who first used copper tools and the subsequent Late Shield people (3000 to 1500 BP) (Dawson 2004, Wright 1995).

Following the Paleo-Indian occupation of the region and the retreat of Lake Agassiz, inland evidence of human presence is limited. All definite evidence in Quetico is restricted to sites in the eastern half of the park, on large lakes along major waterways. This lack of evidence, however, may be a result of survey techniques not oriented to the ancient landforms and the effects of ice ridging, rather than the absence of sites (Dawson 2004).

Little is known with certainty about the Archaic cultures, but it is thought that they practiced a hunting and gathering economy very similar to that observed by early French explorers who traveled among the native Algonquian-speaking peoples of the Canadian Shield. With a climate and flora essentially similar to the present, the faunal resources of the area must also have been similar to those of today. The Archaic people are thought to have had a band structure similar to their descendents, the Ojibwa and Cree. The presence of Archaic sites located on major waterways and islands suggests that they were occupied by large hunting groups and extended families who used both terrestrial and aquatic resources as main food sources with beaver, waterfowl, and bear supplementing their diet (Dawson 1983). High mobility was also required during this period to exploit seasonal resources (Wright 1995). The adaptability of the Archaic people meant that they were able to live sustainably for several thousand years.

One of the technological innovations of the period consisted of the cold working of native copper. A number of copper tools attributed to this period have been recovered in Quetico Provincial Park, including bevelled adzes, socketed projectile points, knives, trihedral adzes, and more (Steinbring 1974, Fox 1977, Haywood 1983). The presence of copper tools in Quetico hints at extensive trade networks as there are no known copper deposits nearby. It is possible the copper originated from Isle Royale, an island southwest of Thunder Bay on Lake Superior, where copper mines have been discovered (Dawson 2004). Other known copper mine sites have been recorded across the north shore of Lake Superior as far east as Michipicoten and on the south shore on the Keweenaw Peninsula (Griffin 1961, West 1929). As well, a number of artifacts likely from the Archaic period have been discovered recently in Quetico, including a jasper taconite projectile point and a Knife Lake siltstone biface (Nelson 1999).

The Middle Shield culture gave rise to the Late Eastern and Late Western Shield cultures (Dawson 2004). Although absolute dating evidence is presently inadequate, it is assumed that this period began when a new ceramic tradition appeared, and lasted from 3000 BP to approximately 1500 BP (Dawson 2004). The introduction of ceramic technology represents the beginning of a new period in history of the Late Shield cultures. In Northwestern Ontario, the Late Western Shield culture was initially classed as a Woodland culture, specifically the Laurel culture, after the discovery of pottery at a site in Rainy River (Dawson 2004).

5.3 Woodland Period

Late Western Shield/Laurel Culture

The Woodland Period is divided into the Initial Woodland period (Late Western Shield/Laurel culture) and the Terminal Woodland period. The Late Western Shield culture is distinguished by the first appearance of pottery, while the Terminal period is defined by a new variety of southern-derived ceramics (Dawson 1983, Wright 1995). The Initial Woodland people of Northwestern Ontario were known as the Laurel Culture (Dawson 1983). Important traits of Laurel pottery include plain conical ceramics (coil method) with toothed-implement decoration such as pseudo-scallop shell, dentate, and dragged stamps on the upper one-third of the ceramics (Dawson 1983). Evidence of this period in Quetico, being more numerous than those of the two previous periods, occur across the region from east to west. Although the Laurel culture campsites display a more generalized distribution than sites of earlier periods, they tend to be restricted to the shores of the larger lakes.

Evidence of the economic pursuits and social structure of these peoples is limited in the region and non-existent in the park. It is assumed that their life style was similar to that of the Archaic and subsequent inhabitants. Like their predecessors, social organization consisted of small discrete communities along lakes and rivers, and an economy

based upon hunting and fishing (Dawson 1983, Wright 1995). The Laurel people were a highly organized and mobile group that consisted of regional bands that were likely based upon local landmarks or leaders (Dawson 1983). One distinct expression of the social structure of the period is the presence of large burial mounds in the west along the Rainy River, which suggests a significant social influence from more southerly cultural groups. The construction of burial mounds and the elaborate burial complex associated with them, continued well into the succeeding Terminal Woodland period in areas both to the east and to the west of Quetico.

The tool-kit of the Laurel culture also changed during this period. There is a noticeable reduction in the size of projectile points, and it is thought that this period marks the development and introduction of the bow and arrow, which might explain the need for smaller points (MCL 1979). Smaller projectile points of the Woodland period have been found in Quetico, including a side-notched point likely of the Laurel culture (Nelson 1999). An intact black chert projectile point was found in the north end of Quetico and is thought to have been used as an arrow point (Nelson 2000).

Arrowhead point, Quetico Provincial Park [M. Mosley]

The Laurel people subsisted on a diet similar to those of the Archaic people with large and small mammals and fish as the predominant food sources (Dawson 1983, Wright 1995). As with most prehistoric sites in the Canadian Shield, faunal remains (bones from past meals) on sites in the Quetico region are rare, due to generally acidic soil conditions that speed decomposition, so much of the knowledge regarding the diet of prehistoric people is based on what food resources would have been available at the time, rather than by evidence of meals and diet. As temperatures warmed, and large game and edible plants became scarce, an increase in the diversity in the food sources that were utilized also occurred (Dawson 1983). Towards the end of the period and due to the cooling climate, populations began to decline primarily due to changing vegetation and game distribution (Dawson 1983).

Blackduck Culture

A further technical development from coil-constructed to paddled ceramics initiated the Terminal Woodland period, which began about 1500 years ago and continued up to the time of European contact in the northwest in the late seventeenth century. The people of the Terminal Woodland period occupied the same general area as the Laurel culture and were known as the Blackduck culture in the area west of Thunder Bay (Dawson 1983). At about 1200 BP the Blackduck culture is identifiable as the Northern Algonkian, ancestors of today's Cree and Ojibwa.

Both the manufacturing technique and the form and decoration of the clay vessels of the Blackduck differ from that of the previous period (Wright 1972). A number of ceramic wares are represented in the Quetico collections, with Blackduck ware predominating. As well, many more ceramic sherds from the Late Woodland period have been recovered throughout Quetico, but cannot be classified further due to missing diagnostic rim and neck sections of the pottery (Nelson 1999). Stone projectile point styles continued to change from Paleo-Indian times onwards, becoming smaller and smaller. Small, triangular and side-notched arrow points characterize the Terminal Woodland period. Finally, the use of native copper tools continued from Archaic times through the Woodland periods, although such tools tend to be smaller and less frequent in later times.

The settlement pattern of the Woodland period was not very different from that of the Archaic period, which was based on use of seasonal campsites. Available archaeological data on settlement patterns and ethnohistory suggests that the Aboriginal society of this period consisted of many small bands which may have divided into smaller units during the winter (depending on available food resources) and gathered together during certain periods of the warm

season at the sites of abundant food resources. However, there is evidence that by the end of this period the population was growing. Blackduck sites are generally larger and more numerous, and like previous tradition are located on lakes and rivers (Dawson 1983). Generally a much wider distribution of sites occurs closer to the historic period. Sites of the Woodland period have been found on many small lakes and rivers deep in the forest where they were not located in previous periods (OMNR 1980). Campsites of the Terminal Woodland period are the most abundant in the park and display the most widespread distribution. Evidence of the Blackduck people is associated with both large and small lakes, relatively isolated but accessible. Information concerning their economic pursuits has been obtained from a number of campsites in northwestern Ontario and Minnesota. It appears that fishing supplied the major food source, supplemented by hunting and gathering of edible plants such as wild rice.

5.4 European Contact and Exploration

Long before the arrival of Europeans, a succession of Aboriginal peoples traveled through the Quetico area using the same water routes familiar to modern day canoeists. Europeans first appeared in the Quetico area in the late seventeenth century, in search of an overland route to the western ocean as well as mineral resources, particularly copper and silver. Another motivation was the search for fur-bearing animals and other wildlife that could be exploited for profit. The identity of the first Europeans to set foot in Quetico is not known with any certainty. It may have been Pierre-Esprit Radisson and Médard Chouart des Groseilliers (later of the Hudson's Bay Company), who passed through the western Lake Superior region in the late 1650s, or it may have been an adventurer from the small colony on the St. Lawrence (Litteljohn 1965). The earliest documented explorers, including Jacques de Noyon and Pierre Gaultier de Varennes, Sieur de La Vérendrye, were Frenchmen seeking to expand the fur trade to the west (Friends of Quetico Park 1992). In 1688, de Noyon paddled up the Kaministiquia:

> *"...packed his gear across the height of land, swung west among the jumbled lakes, beaver-meadows and rivers of the Quetico and arrived, finally, at Rainy Lake, where he spent the winter"* (Litteljohn 1965).

On his return de Noyon travelled through Lac La Croix, and it was he who first recorded the French Portage between French Lake and Windigoostigwan in 1688 (Peruniak 2006). For about thirty years after de Noyon passed through Quetico, records are silent about the region, until the appearance of La Vérendrye (Litteljohn 1965).

Without the help and co-operation of Aboriginal peoples, the first Europeans to set foot in the region (fur traders, explorers and missionaries) would have found it impossible and impenetrable. The Original People, including the Ojibwa of the Quetico area, shared their knowledge with newcomers. The Original People introduced Europeans to birchbark canoes, and soon the French employed Aboriginal methods to construct canoes to suit their purposes. Europeans also adapted sleds, snowshoes, and suitable clothing to cope with the Canadian weather. Aboriginal trapping skills became the economic base of the fur trade, while their knowledge of hunting, and the use of plants for food and medicine, sustained the lives of many Europeans threatened by starvation or disease. In contrast, Europeans introduced many Old World diseases to which Aboriginal people had no immunity, which led to the decimation of these people.

5.5 The Fur Trade

Two historically significant water routes pass directly through Quetico Provincial Park (Figure 11). These ancient trade routes, based on a system of waterways used for thousands of years by the original inhabitants, were used by explorers and fur traders from the seventeenth to the nineteenth centuries as major access to the west. The first route is the Grand Portage/Boundary Waters Fur Trade Route travelling alongside the southern boundary of the park and the other is the Pickerel Lake-Sturgeon Lake route which formed part of the Kaministiquia River Fur Trade Route. Both transportation corridors converge at the mouth of the Maligne River at Lac la Croix (Figures 11 and 28). During the New France period, both networks were used as a basis for exploration westward in search of a western sea, valuable furs and mineral deposits. After 1760, the boundary waters route endured as the most frequented and reliable passageway employed by independent fur traders and other Montreal-based trading associations.

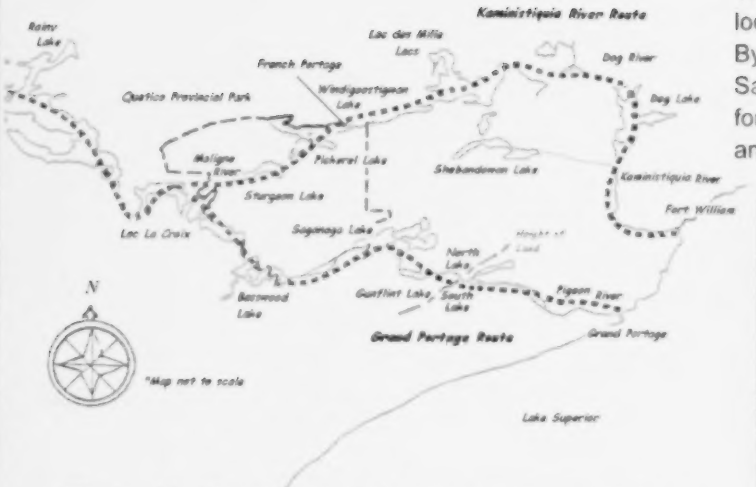


Figure 11: Historic fur trade routes (*Adapted from Friends of Quetico Park 1992*)

The arrival of La Vérendrye to the Quetico area in 1731 marked the beginning of the wave of French traders and explorers who would visit the region. Between 1731 and 1759 many French canoes followed La Vérendrye's route along the boundary waters of Quetico to Lac La Croix in search of furs, including those of the coureurs de bois, or 'runners of the woods' (Litteljohn 1965). When the fur trade first began, Aboriginal people brought the furs to the trading posts, where they would be traded for European goods. It was not long before some of the traders decided to go inland and get the fur themselves. These were the *coureurs de bois*. Coureurs de bois were unlicensed fur traders from New France who traveled into the wilderness where they learned the ways of the woods from the Aboriginal peoples. The independent coureurs de bois played an important role in the European exploration of the continent and in establishing trading contacts with the Aboriginal people. By 1680, despite repeated prohibitions from both the church and colonial authorities, some 500 coureurs de bois were in the Lake Superior country (Wein 2006). Licensing was eventually introduced by the authorities, which established the professional and licensed voyageurs.

Throughout the late seventeenth and the eighteenth centuries, the Aboriginal peoples of northwestern Ontario were increasingly drawn into the European fur trade. Participation in the fur trade not only influenced the economic pursuits and material culture of these peoples, but also their social structure. Trading posts, rather than being seasonally-occupied localities, became focal points for band gatherings. By the mid 1700s, the French had trading posts at Saganaga and Basswood lakes, as well as several forts to the west on Rainy Lake, Lake of the Woods, and beyond (Litteljohn 1965).

Voyageur Canoe [T. van Dyk]

In the late 1700s, when the British took control of Canada and claimed Rupert's Land, the French posts were all but abandoned (Litteljohn 1965). By the late 1770s, fur trading activities in the area were dominated by the presence of the North West Company. An essential part of the company's operations was the maintenance of an elaborate transportation system. For two decades, it relied exclusively on the boundary waters route to get to the rich fur resources of the west. The settlement of the American boundary and the threat of new taxes imposed by the United States on merchandise crossing Grand Portage forced the company to move its operational headquarters from Grand Portage to Fort Kaministiquia, later Fort William (Friends of Quetico Park 1992). These events also led to the rediscovery of the Kaministiquia River route used by the French, including the French Portage. After the amalgamation of the Hudson's Bay and North West companies in 1821, this water network slowly became obsolete as the Hudson's Bay Company

relied more on a north-south rather than an east-west transportation pattern, preferring to route its trade though York factory on Hudson's Bay (Litteljohn 1965).

Up until the mid 1800s, the international boundary in the Quetico area was constantly debated by both the American and Canadian governments. In 1842, the Webster-Ashburton Treaty established the old trade route to Grand Portage as the international boundary in the region. This treaty also gave citizens of both countries the right to travel freely along the boundary lakes and portages without hindrance or customs (Walshe 1984).

Paul Kane (1810-1871) was an artist known to be one of the first Canadian artist-explorers to record life in the Canadian Northwest before European settlement. Over two journeys between 1845 and 1848, Kane travelled across thousands of miles with the fur trade canoe fleets, writing journal entries and sketching Aboriginal people in their homelands (Noftall 2006). In 1846 Paul Kane was provided passage by Sir George Simpson in a fur brigade of the Hudson's Bay Company:

> *"May 30th— We made an early start, reaching the "French Portage" by breakfast-time. Here we lightened the canoes of the principal part of the baggage, and carried across the portage a distance of three miles, in order that we might be able to send the canoes round by the river, which had now become very shallow, to meet us at the further end of the portage. We camped this evening at a small lake called Sturgeon Lake, having come a distance of forty-eight miles, passing "French Portage," and "Portage des Morts."*
>
> *Paul Kane, Wanderings of an Artist*

In the summer of 2006 Ken Lister, of the Royal Ontario Museum, discovered that one of Paul Kane's paintings 'French River Rapids' had been painted at the east end of the French Portage at Quetico, not at the French River at Georgian Bay on Lake Huron as it had previously been identified. Paul Kane's own journal makes reference to a sketch at this location and Lister confirmed this by locating the exact site of the painting and locating himself where Paul Kane would have painted from, seen today from where Highway 11 crosses the French River (Figure 21). There are two almost identical images by Kane titled 'French River Rapids'. One is an oil on paper sketch located at the Stark Museum of Art in Orange, Texas and the other is an oil on canvas painting in the Royal Ontario Museum collection.

5.6 The Dawson Route

Renewed interest in the Quetico region occurred shortly after Confederation when the federal government commissioned the construction of a line of communication between Lake Superior and the Red River settlement. Simon J. Dawson was sent in 1868 to supervise the charting and construction of a transportation route to the west from Thunder Bay to Fort Garry (Litteljohn 1965). This route, known as the Dawson Route, followed the ancient trade routes used by the original inhabitants, and later by the French and the North West Company. It was intended to compete with American rail facilities and to stimulate settlement by serving as a great colonization road, linking the West with the rest of Canada. For a short time, the Dawson Route was the first step on a route through Canada to British Columbia (Peruniak 2000). It was comprised of two wagon roads, and followed much of the old trade routes. Dams were built and small steam tugs assisted travel on larger lakes, remains of which can still be seen today on Pickerel and Sturgeon lakes (Peruniak 2000).

In 1870, a military expedition, led by Lieutenant-Colonel Garnet Wolsley, was sent to quell the Métis unrest of the Riel Rebellion in the Red River settlement (Litteljohn 1965). When 1400 soldiers and 150 large boats arrived at Prince Arthur's Landing in May of 1870, they found little of the more than 450 miles between Thunder Bay and Fort Garry had been completed (Litteljohn 1965). The soldiers spent the next three months assisting Dawson's labourers in the construction of the Dawson Route. By the time the expedition arrived in the autumn, they were dismayed to find Riel had fled, depriving them of the battle they had anticipated (Litteljohn 1965).

The Dawson Route in Quetico begins with the French Portage from Windigoostigwan Lake, and follows the Kaministiquia trade route through Quetico, by way of Pickerel and Sturgeon lakes to Lac La Croix. In 1968, the Quetico Provincial Park boundary was extended north of Highway 11 to encompass the area of a way station on the French Portage, from the time of the Dawson Route, which provided

accommodations for travellers, and facilitated maintenance of the Dawson Route. Excavations of the site yielded a 1871 five cent piece, square nails, and a straight boot- not the left and right footed boots that were introduced in the 1860s- in addition to many other historic artifacts (Dawson and Klinefelder 1971). Another link in the Dawson Route in the Quetico region is the Dawson Trail Portage to the west of Quetico. It is a historic link between the shores of Sand Point Lake and Lac la Croix, which bypasses the Loon River route and was first cut to create passage for the Canadian troops deployed to the Red River settlement to quell the Riel rebellion.

The Dawson Route was a long and arduous one, and in most places was little more than a rough trail through the wilderness. After a decade of sporadic use, the Dawson Route was abandoned when the Canadian Pacific Railway was constructed. Evidence of this route still exists within Quetico Provincial Park as portages and artifacts.

Deux Rivières Portage, William Armstrong 1871

With Confederation in 1867, interest in the northwest was high, and the Canadian Government was anxious to incorporate Rupert's Land, of which the Quetico region was a part (Litteljohn 1965). The Ojibwa continued to claim sovereign rights and control travel through the region. This prompted the Government to enter into treaty negotiations. In 1873, the Anishinaabe of what is now Lac La Croix First Nation signed the Northwest Angle Treaty of 1873 – Treaty 3 with the Crown at the Northwest Angle on Lake of the Woods, and days later Chiefs of the Sturgeon Lake, Seine River, and Lac des Mille Lacs bands signed an adhesion to Treaty 3. The signing of Treaty 3 officially marked the end of Aboriginal sovereignty of the Quetico area, although they retained hunting and fishing rights to the area, and led to the establishment of a reserve on Lac la Croix (Neguagon Lake 25D IR) which presently abuts the western boundary of the park, and a reserve at Kawa Bay on Kawnipi Lake (Sturgeon Lake 24C IR) (Figure 12).

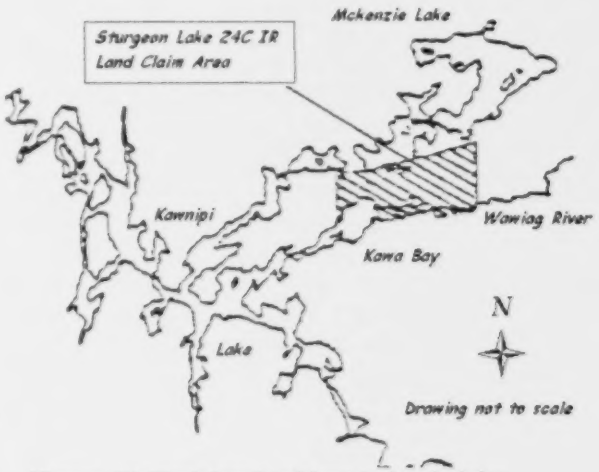


Figure 12: Park land subject to land claim

5.7 Park Establishment

By 1901, Atikokan had been connected to the transcontinental railway system. The westward extension of the railroads stimulated the growth of the forest industry in this region. Much of the logging activity of this early era was geared to the production of ties and poles for use in railroad construction. In the early part of the twentieth century, large companies with centralized sawmilling operations were the predominant extractors of the Quetico resources. Various species were logged including red pine, white pine, jack pine, balsam, spruce, tamarack and cedar. Remains of former logging camps, depicting this era of Quetico's history, still exist within the park's boundaries.

The arrival of the railroad also brought with it a heavy demand for lumber for the construction of railroads and nearby mines. The logging and mining camps put tremendous pressure on the fish and wildlife populations in the Quetico area to feed the workers, especially moose, which was nicknamed 'pine beef'. The rapidly depleting wild game resources resulted in the call by many prominent Canadian and American conservationists to protect the fish, wildlife, and forest resources of the Quetico-Superior country.

The Quetico-Superior country first received official recognition as an area of outstanding natural significance in 1909. On February 18, 1909, U.S. President Theodore Roosevelt set aside 1 018 638 acres as the Superior National Forest, and the Minnesota Game and Fish Commission established the Superior Game Refuge of 1 200 000 acres. Later that year, Ontario followed suit in the Quetico area. On April 1, 1909 by Order-in-Council, the Quetico Forest and Game Reserve was established under the authority of the Forest Reserve Act and encompassed some 445 500 hectares (1 000 000 acres). It was the increasing destruction of wildlife, especially moose that were hunted to feed the lumbering and mining camps, which brought about this original designation.

The Quetico Forest and Game Reserve was created on the traditional lands of the Anishinaabe. With the new regulations prohibiting hunting and fishing on the traditional areas, those living within the game reserve were relocated to residential reserves beyond Quetico's boundary, including the Neguagon Lake 25D reserve at Lac La Croix and to the Lac Des Milles Lac 22A1 reserve on the northeast shore of Lac Des Milles Lac. In 1915 the Sturgeon Lake 24C IR was cancelled by the federal government, and is currently subject to a land claim, filed by Lac La Croix in 1980.

The creation of the Quetico Forest Reserve did little to stop the depletion of the fish and game. With only ten rangers patrolling the park for five months of the year, hunters for the logging camps and trappers had little fear of being caught (Walshe 1984). In 1911 Quetico's first game warden was appointed, who promptly commandeered the construction of ranger cabins at strategic locations throughout the park, set up a headquarters at French Lake, and cut an overland trail from French Lake to Kawene, on the Canadian National Railway (Walshe 1984).

Four years later on November 7, 1913, an Order-in-Council changed the name of the Quetico Forest Reserve to Quetico Provincial Park. The park was to be "reserved and set apart as a public park and forest reserve, fish and game reserve, health resort and fishing ground for the benefit, advantage and enjoyment of the people of Ontario". Non-recreational uses, however, were not excluded; commercial fishing, mining exploration and logging were permitted to continue within the park's boundaries. Quetico was a popular destination for American tourists at the time, but still little known to residents of Ontario.

Between 1910 and 1920, logging began in Quetico, driven in part by the outbreak of World War I and the need for resources to support the war effort. Dams and sluiceways were erected to facilitate the log drives. During this time the new Forestry Branch within the Lands and Forests Ministry was charged with fire protection duties. As a result, fire detection towers were built throughout the park, and connected by miles of telephone wire. Park rangers at the time had a number of duties, including watching for poachers, fighting fires, and clearing portages (Peruniak 2000).

One of the biggest threats to Quetico's wilderness character came in the late 1920s. E.W. Backus, an American businessman with enormous timber and power interests, owned water power rights in the Boundary Waters area. He proposed to harness the hydroelectric power of the boundary waters by building control dams along the lakes and rivers of the region, a plan which came to be known as the Backus plan (Peruniak 2000). If the plan was completed, water levels in the border lakes would rise by an astonishing 4.6 to 24 metres, causing immeasurable damage to the surrounding landscape (Killan 1993). In 1925 the matter was referred to the International Joint Commission (IJC), set up by the U.S. and Canada to help resolve disputes over cross-border water issues, after strong objection by conservationists, various levels of government, and local communities and businesses (Peruniak 2000).

In 1927, Ernest Oberholtzer, an American conservationist and long-time supporter of the Quetico-Superior country, and other American conservationists formed the Quetico-Superior Council (which also contained a Canadian Advisory Board) to help fight Backus' proposal (Walshe 1984). The Council also called for protection of the entire Rainy River watershed, much of which lies in Ontario, and called for a treaty between the governments of Canada and the U.S. to guarantee the retention of the international wilderness of the Quetico-Superior country in a wild state (Walshe 1984). In 1929 the Royal Canadian Legion and the American Legion endorsed the plan and urged that the area be dedicated to veterans of both countries as an international peace memorial forest (Walshe 1984).

The Quetico-Superior Council won a major victory with the passage of the U.S. Congress Shipstead-Nolan Act of 1930. This act severely restricted water power development along the boundary waters, and in combination with harsh economic times of the Great Depression, effectively crippled Backus' grand scheme. In early 1934, U.S. President Franklin D. Roosevelt created the 'President's Committee for the Quetico-Superior' to support the preservation of the area. Finally in 1934, the IJC ruled that Backus's plan could not proceed, ending one of the great fights for wilderness in the Quetico-Superior country:

> *"The boundary lakes are of matchless scenic beauty and of inestimable value from the recreational and tourist viewpoints. The Commission fully sympathizes with the objects and desires of others who take the position that nothing should mar the beauty of the last great wilderness"*
>
> *International Joint Commission 1934*

The 1940s saw a strengthening of conservation measures in the Quetico-Superior area, with greater restrictions placed on shoreline cutting in Quetico, the prohibition of logging in a portion of the roadless area opposite Quetico (the future BWCAW Roadless Area), and a prohibition on granting leases for private development in Quetico, while American agencies began acquiring private properties in the BWCAW (Walshe 1984).

The Canadian Quetico-Superior Committee was established in 1949 and worked closely with the President's Committee to advocate for the full protection of shorelines, prohibition of permanent flooding, restoration to a natural state of areas logged or mined, closing of logging and mining roads when activities halted, and the best possible conservation management of fish and wildlife resources (Walshe 1984). The Canadian Quetico-Superior Committee was dissolved in 1954, and a charter granted to the Quetico Foundation. The Quetico Foundation pledged to promote wilderness areas and assist with educational and scientific studies therein (Walshe 1984).

During the 1960s there were repeated calls by conservationists from both sides of the border to place more restrictions on aircraft flying into the wilderness areas, to eliminate more resorts, to ban logging in Quetico altogether, and to have the park reclassified as a primitive class park where commercial exploitation would be prohibited (Walshe 1984). The Ontario government made progress on these appeals with the instituting of skyline reserves in Quetico, which meant that logging activity could not be seen from anywhere on a lake, rather than the former 400 foot shoreline reserves, and a commitment to buying the mining patents within Quetico. By the late sixties, with recreational pressures as well as extraction demands continuing to increase, it became evident that Quetico could not continue to satisfy all demands indefinitely.

In 1967, Quetico Provincial Park was classified as a Natural Environment class park, under the new park classification system. The primary aim of this class was to "set aside for the ... purpose of recreation and education, areas of outstanding scenic, natural or historic significance" (Killan 1993). It was to be managed under the multiple-use principle, and while recreation would be the dominant use, logging would be permitted (Killan 1993). By 1969, the entire northern portion of Quetico, outside of Hunter Island, was covered by timber licenses.

The environmental conservation movement of the late sixties and early seventies culminated with respect to Quetico in a controversy over the compatibility of logging within the park. In response, the Minister of the then Department of Lands and Forests appointed the Quetico Provincial Park dvisory Committee to study the problem and make recommendations.

Supported by both public and technical input, the Advisory Committee reviewed the primary issue of logging within Quetico, as well as a variety of other management issues in need of resolution. On May 13th, 1971, acting in response to the Advisory Committee's first recommendations, the Premier of Ontario announced the immediate discontinuation of logging.

In June 1973, after the Advisory Committee reported its findings and made a series of recommendations to the Minister of Natural Resources, the Minister announced to the Ontario Legislature the acceptance of the Quetico Provincial Park Advisory Committee's recommendations, and also announced that Quetico would be reclassified as a Primitive class park, (later known as wilderness class) which finally put an end to logging in Quetico. Also prohibited were mining

and hunting, and a policy to reduce and eventually eliminate motor-boat use was introduced. The aim of primitive parks was to "set aside representative areas of natural landscapes for posterity and to provide for ...wilderness recreation activities and for educational and scientific use" (Killan 1993). Quetico was officially classified as a wilderness class park, as it is known today, in 1978 (Reg. # 281-80). Shortly after in 1979, the Fraser-Vento-Andersen bill was passed that further restricted motorized transportation in the Boundary Waters Canoe Area Wilderness, and prohibited logging and mining activities. Conservationists on both sides of the border had much to celebrate with the designation of the two wilderness areas along the international boundary, which early conservationists had fought so hard to protect.

The Quetico Provincial Park Master Plan was approved in 1977. The approved plan provided an expression of how the government intended the park to be planned, developed and managed over a period of time. This management plan called for the implementation of a visitor distribution program, prohibition of outboard motors, snowmobiles, cans, bottles, initiation of a prescribed burn plan, and limitation of group sizes to ten people. In 1981 and 1988, the MNR and the Provincial Parks Council initiated reviews of the management plan to ensure that the park management plan remained current and relevant and to address specific issues, resulting in the 1982 and 1989 Revised Park Policy (management plan), respectively. The revised park policy integrated accepted recommendations of the Provincial Parks Council. In the 1988 review, changes to the Provincial Parks Act and regulations, new information on park's resources and visitation, and development of district land use guidelines (DLUG) needed to be considered, as well as on-going issues (role of Quetico in relation to tourism within the community, Lac La Croix First Nation's socio-economic needs, resource management plans). In some sections, changes were necessary to reflect revised policies or intentions, but no major policy changes were made in either revised policy.

A major amendment was initiated by the Lac La Croix First Nation in 1992 to expand the number of lakes permitting motorized access by the Lac La Croix Guides Association, which resulted in the Agreement of Co-existence (1994) and the Revised Park Policy (1995). This agreement between Lac La Croix First Nation and the Province of Ontario, represented by the Minister of Natural Resources and the Minister for Native Affairs, was intended to redress the First Nation for their displacement from their traditional homeland and loss of economic opportunities and to work towards the provision of opportunities for employment and economic diversification. The Agreement of Co-existence established a framework for long-term employment targets, spiritual and cultural use of Quetico, management and interpretation of aboriginal resources, co-management of mechanized guiding activity, and year-round road access to the Indian Reserve. Key elements of the agreement included creation of a mechanized guiding zone for members of the LLCFN Guides Association (W2) to be co-managed with LLCFN; relocation of the Lac La Croix entry station to the community of Lac La Croix; and a commitment to open communications between LLCFN and Quetico Provincial Park. Governing principles of this agreement include:

> *"All governments in Ontario, provincial and First Nations alike, have a shared responsibility to preserve, protect and enhance lands and natural resources for the benefit of future generations.*
>
> *The creation of Quetico Provincial Park has partially severed the people of Lac La Croix First Nation from their sacrosanct relationship with their ancestral homeland, the social health of Mind, Body and Spirit which is attributable to their relationship with the land and the economic benefits derived from the land area.*
>
> *The Parties agree that in light of indignities suffered by the citizens of the First Nation, their displacement from their traditional homeland and the loss of significant economic opportunities due to the creation of Quetico Provincial Park, it is vital to foster and promote a co-operative government-to-government relationship of co-existence which recognizes the First Nation as a co-decision-maker in accordance with the provisions of this Agreement in the Quetico Area while providing significant cultural, social and economic opportunities to the First Nation.*

The First Nation must be an active and full participant in the future planning, development and management of the Quetico Area."

Over the past decade, this agreement has facilitated the development of a work centre and park entry station on the Lac La Croix Reserve, as well as the provision of yearly funding which the band uses to support staff positions at the village work centre/entry station, at the Beaverhouse entry station, as well as an interior portage maintenance crew. Park warden and natural heritage education positions have also been funded. See Appendix II for the complete principles of the Agreement of Co-existence.

6.0 RECREATION

Quetico Provincial Park offers a variety of recreation opportunities, in an array of natural settings. Recreational activities in Quetico have been limited to primitive forms of travel, as well as those activities that are associated and compatible with primitive travel. The types of primitive travel provided for have only been those consistent within the historical context of the park. Permitted activities include:

- Canoeing
- Camping
- Swimming
- Sport fishing
- Nature Appreciation
- Photography / Painting
- Hiking
- Snowshoeing
- Cross-country skiing

6.1 Canoeing

"The canoe is a symbol unique to Canada. It is one of the greatest gifts of the First Peoples to all those who came after. It is the most powerful symbol joining the Native Peoples to the two founding cultures of Europe- French and English. It is a symbol of exploration and discovery, of individual courage and of partnership, of heroic enterprise and of quiet harmony with Nature."

John Jennings, in *The Canoe in Canadian Cultures*

The reputation of Quetico Provincial Park is based upon its outstanding wilderness canoeing opportunities, and Quetico is considered primarily to be the domain of the canoeist. The park's erratic drainage system provides a myriad of interconnecting lakes and streams from which the canoeist can choose a route suitable to individual preferences and abilities. Figure 28 shows the most prominent of Quetico's canoe routes.

[©GaryAndJoanieMcGuffin.com]

Many factors contribute to the quality of the canoeing available within the park. The extensive network of lakes and rivers increases the variety of the wilderness travel experience. The canoeist can choose a short and relatively easy trip or, alternatively, a lengthy one requiring skilful canoe-handling and rigorous portaging. The visitor's realization that Quetico's waterways were plied in historic times by Aboriginal peoples and voyageurs enhances the canoeing experience.

"Quetico is definitely made for the canoe, or, better yet, the canoe is perfectly made for Quetico. It is truly a paddler's paradise"

Kevin Callan, A Paddler's Guide to Quetico and Beyond

Canoeing activity within Quetico fans out into the interior from the entry stations. Canoe routes are most heavily travelled in the southern sector of the park, which is accessible by the busiest entry stations. In the north, use is greatest in the sector of the park accessible from the French Lake entry station.

Interior campsites in Quetico have minimal development. There are more than 2000 interior campsites within the park, and all are unmarked (by signs), have no privies or fire grates, and are available on a first-come first-serve basis. Sites are

identified by established fire rings, and campers are encouraged to use sites with fire rings rather than create new campsites. Structures such as benches and tables are not permitted, and are dismantled by park staff when discovered. Many campsites have been used by aboriginal peoples for thousands of years, and signs of this may occasionally be seen. Their presence should be respected and left as they were found.

Quetico has a vast network of portages connecting most of the lakes and rivers within the park, totalling more than 170 km in length which are cleared each year by portage crews. Portages are unmarked (by signs) in Quetico. Routine maintenance includes clearing fallen trees, brushing, as well as installing tree-stem corduroy and boardwalks in heavily used or wet areas. Notable improvements have been made at a few of the most heavily used portages in the park. The Stanton Bay portage into Pickerel Lake has sections of boardwalk; erosion control structures have been installed at the portage from Nym Lake into Batchewaung as well as on the portage from Sucker Lake to Basswood Lake at Prairie Portage. Many portages in areas which are susceptible to low water often have numerous offshoot trails, usable depending on current water levels.

The interior of the park is patrolled by Park Wardens. They enforce compliance with the park's regulations by checking permits, party size limits, enforcing fishing regulations, enforcing the can and bottle ban, and numerous other regulations, as well as enforcing restricted fire zone (RFZ) orders during a fire ban, which may include restricting access to certain areas of the park.

6.2 Sport Fishing

Quetico Provincial Park is well-known for the quality of its fishing opportunities. A variety of sport fish are found within the park. The most sought-after species include walleye, lake trout, northern pike and smallmouth bass. As a general rule, anglers can catch most or all of these species within one water body.

In 1975, a partial ban on motorboats was implemented which permitted small boats and motors on designated lakes only by members of the Lac La Croix Guides Association. Without the opportunity to use motor-powered craft, most anglers were unable to gain access on a daily basis to many of the prime fishing lakes located within the park, and previous pressures on the park's fishery resource were lessened in most areas, with the exception of W2. Consequently, fishing opportunities continue to be of high quality.

The majority of the park's visitors come to enjoy a wilderness experience, with fishing being an important aspect of the visitor's experience. A 2004 angler survey conducted across the park indicated that 85% of interior park angling parties took part in fishing activities to some extent and 37% visited for the primary purpose of fishing (OMNR 2004). In a 2006 survey of interior campers, 35% of respondents reported fishing as being the most satisfying aspect of the trip (OMNR 2006).

[©GaryAndJoanieMcGuffin.com]

Fishing pressure is not distributed evenly throughout the park's operating season. The incidence of fishing is highest in spring and early summer, when the walleye season opens and park users interested solely (or at least primarily) in that activity prevail. Fishing tends to be concentrated on the periphery of the park as lakes popular with anglers tend to be those that are more easily accessible. Popular fishing lakes include Quetico Lake, Beaverhouse Lake, Jean Lake, Pickerel Lake, Basswood Lake, Saganaga Lake and the boundary waters, as well as the motorized guiding lakes in W2 (Figure 28).

Fish harvest in the park tends to be biased toward walleye, while introduced species, such as smallmouth bass, are favoured for catch and release. This has potential to create an imbalance in affected fish communities, as their populations become stressed. Anglers are encouraged to fish for immediate consumption, with emphasis placed on

consumption of introduced sport fish, such as smallmouth bass and black crappie. The remote travel and frequent portages make it less suited to transporting fish, which reduces pressure on the fishery.

2008 Quetico Fishing Regulations

In 2008 the use of barbed hooks will be prohibited in all of Quetico's waters. A barbless hook reduces the amount of damage caused to a fish when it is caught and helps to reduce handling time prior to release. Barbless hooks also have the added benefit of being easier to remove when accidentally embedded in people.

The no-live-bait restriction has been expanded to include all organic materials including but not limited to fresh, frozen, or dried human food, minnows, worms, and leeches. The use of organic bait can create opportunities to unintentionally introduce invasive species and bacteria that can be detrimental to native species. The use of manufactured biodegradable organic bait is encouraged as it reduces the risk of unintentional contamination and litter.

6.3 Nature Appreciation and Activities

The interior of Quetico Provincial Park and the Dawson Trail Campground offer exceptional nature appreciation opportunities. Solitude, relaxation, and contemplation are easily found throughout the park. Bird watching and nature study are popular pursuits; Quetico has an interesting mix of boreal, mixed forest, and deciduous flora and fauna. Quetico is also ideal for stargazing, both for meteor showers in the summer and the aurora borealis (northern lights) in winter. Quetico offers spectacular vistas for artistic pursuits including drawing and painting, as well as photography and nature study. Quetico's beauty has inspired the likes of Paul Kane, one of Canada's pioneer artists, as well as the legendary conservationist and author, Sigurd F. Olson.

6.4 Hiking

Quetico, although not known for its hiking opportunities, has a small network of good day-hiking and interpretive trails located in the French Lake Access Zone (Figure 21). At the Dawson Trail Campground, there are seven short interpretive trails (1.2 to 2.2 km each in length) that are used by car-campers and day-users. Interpretive signs are located at points of interest, and guided interpretive walks are conducted by Natural Heritage Education staff. A 1 km barrier-free boardwalk runs alongside the Pickerel River from the pavilion to the playground beach. In addition, a 4.4 km hiking trail runs south and west from the campground to The Pines beach on Pickerel Lake, and a 4.2 km hiking trail runs parallel to the French River on the former Camp 111 logging road. The network of abandoned logging roads in the northeast sector of the park has low potential for canoeing, and combined with few lakes and connecting streams, provides potential back-country hiking opportunities. At one point there were more than 160 km of interconnecting roads in this area, although most have grown in.

6.5 Winter Activities

Quetico offers opportunities for a number of winter activities. Ice fishing is a popular winter activity with most ice fishing occurring on the peripheral lakes along the northern boundary and along the boundary waters. Back-country snowshoeing and cross-country skiing are also popular. The park's Natural Heritage Education program and the local cross-country ski club provide some winter programming in the Dawson Trail area. A challenging winter wilderness experience is available for the enthusiast who ventures into the interior. However, safety precautions and winter camping skills and equipment are necessary because of the severe winter climate and reduced park staff available for search and rescue in the winter season.

[M. Mosley]

Cross-country Skiing

Quetico Provincial Park has developed a classic ski

trail system on Dawson Trial campground roads, hiking trails, and new ski trails. There are almost 30 km of classic groomed ski trails within the French Lake access zone area, and another 12km loop north of French Lake at the Mink Lake Ontario Ranger camp, just outside the park (Figure 21). Trails within the park take skiers along scenic routes along the Pickerel River to The Pines, along Baptism Creek, and the French River Trail. As well, a 24 km loop to Sawmill Lake is the basis for an annual ski tour. Skiers experience a park transformed: frozen lakes and streams, abundant animal tracks in the snow, and quiet solitude.

Snowshoeing

Backcountry snowshoeing is a popular activity in Quetico, due both to the serene setting and ease of use. Snowshoeing is arguably the oldest form of winter travel in the park, as the traditional mode of transportation for native peoples, trappers, and early Park Rangers. Quetico is ideal for snowshoeing, with a myriad of frozen lakes and streams.

Dog sledding, Skijoring

Dog sledding was an historical mode of travel for trappers and early Park Rangers. Skijoring, or a skier being harnessed to and pulled by a dog or dogs, is a winter activity that might be enjoyed in Quetico. Currently, neither activity is addressed as a permitted activity under Quetico's park policy or in Ontario Provincial Park's policy.

6.6 Climate Change and Recreation

Outdoor recreation is another area that will be impacted by climate change. The Atikokan-Quetico area already shows a trend towards hotter days in summer, milder days in winter, and reduced snow cover. In addition to affecting the physical environment of Quetico and the plants and wildlife found there, it also has the potential to affect both wilderness experiences in Quetico and the degree of use the park experience throughout the year. Changes in fish abundance and distribution (such as a reduction in lake trout and walleye populations) may affect angling opportunities in Quetico, and changes in vegetation and wildlife abundance and distribution (such as larger forest fires, and fewer moose) may affect nature viewing and appreciation opportunities. The potential for increasing fire severity and size also may lead to more RFZs and area closures within the park, affecting both the distribution of campers within the park and the number of interior campers in increased fire activity years. Warming temperatures in spring and fall results in a longer warm weather outdoor recreation season (Colombo et al. 2007, Racey 2004). This may lead to increased shoulder season use in Quetico, and increased use earlier and later in the operating season. Warming temperatures and reduced ice and snow cover are also predicted (Racey 2004). As a result, there may be fewer opportunities for winter recreation, due to less reliable snow and ice conditions for skiing and ice fishing.

6.7 Natural Heritage Education

By definition, the Natural Heritage Education Program (NHE) is the method by which park managers aid visitors in recognizing, using and enjoying the educational potential of the provincial parks system. There are three levels of Natural Heritage Education service provided in the Provincial Park system; self-use, seasonal activity, major activity. Quetico Provincial Park offers a major activity level of NHE service.

As outlined in the Strategic Plan for Natural Heritage Education in Ontario Parks 2005-2010 (2005), the goal of the Natural Heritage Education Program is to develop visitor awareness and appreciation of Ontario Park's cultural and natural heritage through a variety of NHE opportunities, fostering a commitment to its protection for all generations. These opportunities will be educational and recreational, offered formally and informally, and will be accessible to all people. Natural Heritage Education will reinforce the Ontario Governments commitment to ensuring a healthy natural environment for all Ontarians.

There are three components to the Natural Heritage Education Program: Information, Interpretation and Outdoor Recreation. Major activity parks address all three components. Quetico provides a combination of staff led NHE interpretive and outdoor skills programs, self-use facilities such as nature trails, interpretive signs, displays and exhibits, and a park information program including park tabloids, park leaflets, a park interior map and wilderness guide. Quetico's NHE program is guided by Ontario Parks' policies and standards as well as Provincial and Zone NHE Plans. A park level NHE operating plan is required which details the specifics of Quetico's NHE

program delivery. The scope and intent of all NHE programs will ensure compatibility with park features. These plans are reviewed and updated as required.

The objective of Quetico's NHE program as outlined in the 1995 Park Management Plan is to ensure that park users can develop an appreciation for the intent and meaning of the wilderness concept as set out in the park goal, become acquainted with individual park objectives and themes, have access to information of specific interest, and be made aware of the policies and regulations which have a bearing on their activities within the park.

Quetico's Natural Heritage Education program emphasizes management messages such as wilderness ethics, and provides interpretive programs that offer opportunities for people to experience and understand the meaning and purpose of wilderness. The main NHE themes are:

Wilderness: Exploring the philosophy of wilderness and attempting to foster among users an appreciation and understanding of the dynamics of ecological processes.

Cultural: The history of Quetico from the earliest times to the present, including the First Nations cultures, the fur trade, the Dawson Trail route and the more recent logging era. An Ojibway interpretative component has also been incorporated in partnership with the Lac La Croix First Nation as a component of the Agreement of Co-Existence

Park NHE facilities include the Heritage and Information Pavilion built in 1985 at French Lake which provides the administrative hub for NHE staff and program planning activities. It is the primary location for the park's educational and interpretive displays and exhibits. This building also serves as the Dawson Trail Campground's gatehouse, the French Lake Entry Station for interior travellers, the location of the John B. Ridley Research Library and the Friends of Quetico park store, and provides offices for park operations staff.

The 1995 construction of the Teaching Place, a multi-use activity centre in the form of a roundhouse, assists in providing one of the key facilities at the Dawson Trail Campground for the delivery of interpretative and First Nations programs. The Ranger Hall Nature Centre log cabin located at the French Lake day use area is used for the delivery of children's educational programs during the summer camping season and for special NHE programs and events during winter months. NHE programs are also delivered in this area by the campfire pit e.g. evening campfire programs, historical re-enactments and special events, on French Lake e.g. paddling historic voyageur canoes, wilderness and canoe skills programs, and on the various nature trails at the campground e.g. guided hikes.

Ranger Hall Nature Centre [T. van Dyk]

Quetico's NHE program deals with two distinct park user groups – interior wilderness paddlers and Dawson Trail Campground users. Informational and interpretive messages are also delivered through a series of orientation kiosks and park publications at the Dawson Trail Campground and park entry stations, providing valuable backcountry travel information and wilderness ethics to interior users and park visitors.

[T. van Dyk]

7.0 ECONOMIC BENEFITS AND MARKET ANALYSIS

Quetico is a major part of an important system of parks and wilderness areas centred on the historical travel corridor between Lake Superior and Lake of the Woods. There are extensive opportunities within this area for water-dependent and water-enhanced recreational activities. To the north, Turtle River-White Otter Lake Provincial Park, and to the west Voyageurs National Park in the U.S., provide opportunities for such activities as backcountry canoeing and fishing, day-use, car-camping, power boating and snowmobiling; to the south, the U.S. Forest Service's Boundary Waters Canoe Area Wilderness (BWCAW) offers backcountry canoe tripping, power boating (with restrictions) and fishing; and to the east, La Verendrye Provincial Park has opportunities for fishing, canoeing and backcountry camping.

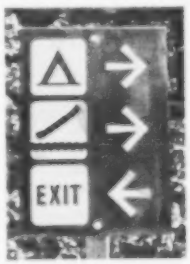
Quetico is related to another travel corridor, Highway 11, which connects Thunder Bay and Fort Frances. The campground at French Lake provides stopover camping opportunities to travelers on that segment of the highway. Access points and canoe routes on Crown land outside of Quetico provide alternative opportunities for canoeing, fishing and boating. Quetico continues to provide a distinct alternative in terms of non-intensive, human-powered outdoor recreation.

7.1 Park Visitation

Approximately 26 300 people visit Quetico each year, with 118 000 camper nights spent in the park. Approximately 8200 people visit the campground each year, resulting in 15 000 camper nights in the campground. Approximately 18 000 people visit the interior of the park each year, resulting in 103 000 camper nights. Since the last management plan review in 1995, there has been a gradual but steady decline in the number of park visitors.

In 2005, 16 000 people entered Quetico's interior. Of these, more than 90 % were from the U.S. (14 127) and 55% of interior visitors entered through the southern boundary of the park. The 2006 Quetico Provincial Park Interior Visitor Survey asked respondents to provide their entry point: 34% of visitors entered via Prairie Portage through the Basswood River (5%), Sarah Lake (5%), Agnes Lake (13%), Carp Lake (6%) and Kahshahpiwi (5%) entry points (Figure 26). Another 12% of entries were associated with the Cache Bay Entry Station, including the Falls Chain Lakes (8%), Boundary Point (3%) and Cache Bay Fly-in (1%). Combined, these figures represent 56% of entries through the two southern entry stations and eight entry points. Dawson Trail and Atikokan accounted for 28% of all park entries via the northern entries with Pickerel entry point at 16%, Batchewaung at 7% and Sue Falls at 5%. Beaverhouse entry station accounted for 9% of entries via the Quetico Lake entry point (9%) and Lac La Croix entry station accounted for 6% via Maligne River, McAree Lake and Bottle River entry points (all at 2%).

7.2 Characteristics of Park Visitors



Quetico has typically two very different types of users: those looking for a wilderness canoe-based experience, and those that enjoy the amenities provided by the campgrounds. A detailed survey of campground visitors has not been conducted.

Typically, use is high in the campgrounds by Ontario residents. Approximately 70% of campground permits issued each year are to Ontario residents (83% to Canadians), with American visitors typically buying only 16% of campground permits sold.

Based on the 2006 Quetico Provincial Park Interior Visitor Survey, the majority of interior park visitors were groups of friends (31%), followed by immediate family (23%), and individual couples (15%); only 8% were organized groups. The largest age cohorts of visitors were adults ages 45-64 (40%) and adults age 25-44 (27%). The third largest group was ages 15 to 24 (17%). Children 10 to 14 accounted for 9% and adults over 65 accounted for 6% of interior visitors.

Quetico has a party size limit of nine persons. In 2006, the average number of people in a party was four. The most commonly reported group size was 2 (30%) followed by 4 (21%) and 6 (12%). Nineteen percent of respondents indicated a party size over 6 with half of these (9%) at the maximum group size. The average number of males per group was three while the average number of females was one per group.

The majority of visitors to Quetico have been to the park on a previous trip (83%). Eleven to twenty previous visits was the most common grouping followed by six to ten visits (18%). Visitors that had previously visited Quetico had been coming since 1948 and the mean year of the first visit was 1987.

On average, interior visitors in 2006 stayed 8 nights in the park. Of the 1998 interior survey respondents, the majority of visitors spent six nights camping in the park (21.5%), followed by 8 to 10 nights (18.7%) and 5 nights (18.1%). Organized groups averaged longer lengths of stay at 7 nights than did unorganized groups at 5 nights. The impact of the organized group on the park's resource base is further emphasized by party size; organized groups averaged over thirteen individuals per party.

The 2006 Interior Camper Survey asked respondents to identify their interior user style. The most common response reported being new area explorers (32%), followed by extreme traveller (18%), angler first and foremost (15%), favourite area traveller (12%), and base camper (12%).

As part of the survey, respondents were asked to identify their highest level of education achieved. Generally visitors to provincial parks are well educated. Ninety-eight percent of respondents had at least some level of college or university education with 42% indicating completion of a post graduate degree, 11% indicating some post graduate university, 21% indicating university graduate, 14% indicating college graduate and 10% indicating some college or university. With regard to household income, the most common response for Canadians was in the $50 000 - $59 000 range (17%). For U.S. funds the most common response category was $100 000-$109 000 (12%).

Respondents were also asked to identify their permanent residence (Figure 13). Most of the respondents (88%) indicated a permanent residence in the U.S. with most (33%) originating in the North Central U.S. Of Canadian visitors, most came from Central Ontario (4% of total visitation).

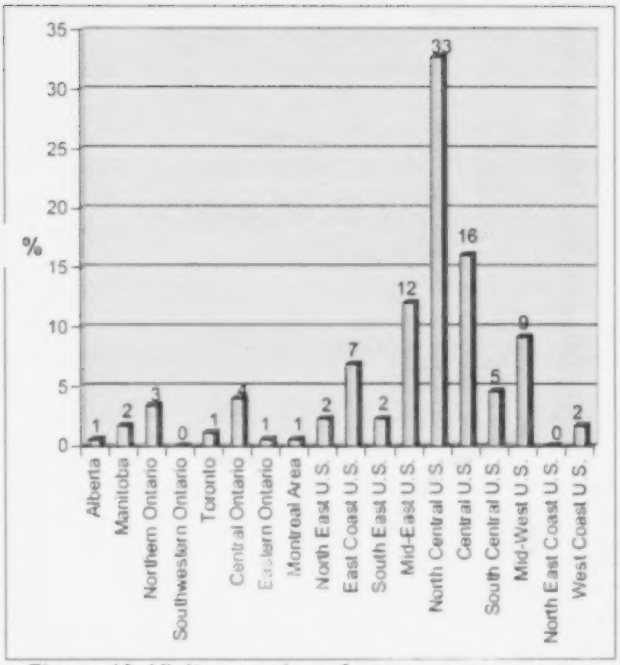


Figure 13: Visitors region of permanent residence, North East Coast (US) = CT, MA, ME, NH, NJ, RI, VT; North East (US) = DE, NY, PA; Central East Coast (US) = DC, MD, NC, SC, VA, WV; South-East (US) = AL, FL, GA, MS; Mid-East (US) = IN, KY, MI, OH; North Central (US) = IA, MN, MT, ND, SD, WI; Central (US) = IL, KS, MO, NE; South Central (US) = AR, LA, OK, TX; Mid-West (US) = AZ, CO, ID, NM, NV, UT, WY; West Coast (US) = AK, CA, HI, OR, WA

2006 Survey participants were asked to identify what was getting better regarding the quality of the park's interior environment. Nearly 38% of respondents felt that campsites were cleaner than in the past. This was closely followed by portages being better maintained (36%). In addition to being asked about what was better, campers were asked to identify what was getting worse about the park's interior environment. The most common responses were the campsites (30%), more people (21%), and toilet paper/human waste (19%).

7.3 Characteristics of Wilderness Users

The requirements of wilderness users are highly exclusionary. They place high value on solitude and prefer few contacts with other users, relatively isolated campsites, and an increasing degree of isolation as distance from the park periphery increases. Such preferences can be expected to be particularly strong in Quetico. Since paddling canoeists have been demonstrated to rank amongst the purest of wilderness users and since paddle canoeing will represent the only form of water travel

within Quetico (with the full implementation of the motor ban), demands for a high quality wilderness experience continue to be high.

7.4 Economic Benefits Analysis

Provincial parks provide a wide range of social, economic and environmental benefits. Some of the benefits can be measured in economic terms, other benefits cannot.

Economic impacts are based on expenditures. The expenditures made by the park on operations and capital as well as the average visitor trip expenditures (camper and day visitor) compose the initial expenditure. Visitor expenditure information was taken from the 2000 Park User Survey. Park operating and capital expenditures are taken from the Ontario Parks unit cost analysis sheets. The following is the most recent estimate of the economic impacts associated with Quetico Provincial Park.

Economic impact is one way to demonstrate the flow of park and visitor expenditures in the economy. Ontario Parks calculates the economic impacts associated with park expenditures and the estimated visitor spending at provincial parks.

Park and Visitor Spending For Fiscal 2000-2001:
Quetico - **$ 8 590 354** million initial expenditure
(park operations- **$ 1 100 614**; capital- **$ 198 000**; visitors- **$ 7 291 740**)

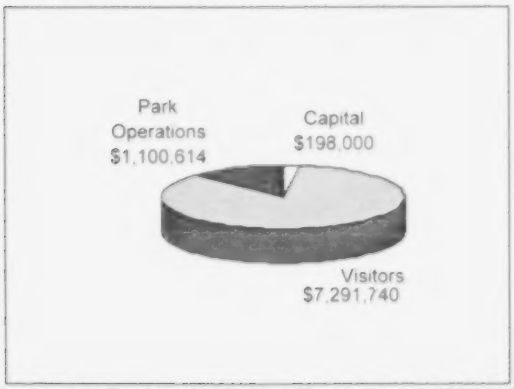


Figure 14: Park and Visitor Spending in 2000-2001 Fiscal Year for Quetico Provincial Park

The following are indicators of economic impact:

- value added
- wages and salaries
- provincial person years of employment.

Based on an initial expenditure of $ 8 590 354, the following impacts were sustained at Quetico. The impact figures are for total economic effects (direct + indirect + induced effects):

- Value Added - **$ 10 554 846**
- Wages & Salaries - **$ 6 675 663**
- Provincial Person Years of Employment- **191**

Provincial parks help to make communities attractive for business as well as for residents, tourists, and retirees. Businesses bring employment opportunities and support the local tax base. The retirement community brings in pension income which is often indexed to inflation and is recession proof. Communities with attractive waterfronts, low crime, recreational activities and healthy environments are sought out by both businesses and the retirement community. The park budget represents a grant or transfer payment from the government to their community. Not all communities have this transfer.

For many communities in northern Ontario, the most tangible aspect of the provincial park support is the number of jobs created annually. The combined expenditures at Quetico Provincial Park support approximately 191 person years of employment in the province each year. This economic activity provides the area with employment opportunities and contributes to a stable local economy and community.

Quetico Provincial Park provides economic benefit to the community of Atikokan through the direct employment of some of its residents. Approximately 42 seasonal (including students) and permanent positions with Quetico are staffed by residents of Atikokan each year, which translates to approximately 18 person years of employment annually (Figure 15). An additional six seasonal positions are staffed by members of the Lac La Croix First Nation, funded by Quetico Provincial Park and the Lac La Croix Partnership Agreement, equalling approximately two person years of employment annually. A breakdown of the total number of positions and person years of employment funded by Quetico Provincial Park and the Lac La Croix Partnership Agreement each year is shown below in Figure 15.

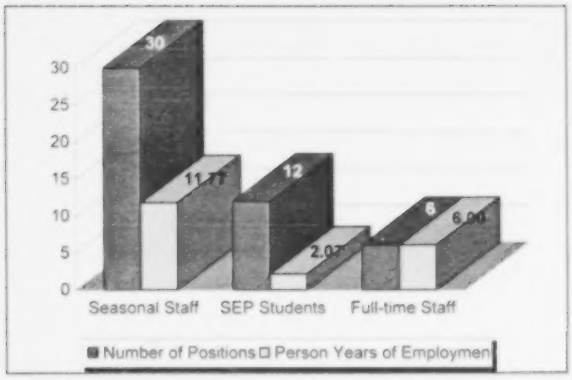


Figure 15: Annual Number of Positions and Person Years of Employment Funded

There are also a number of other positions related to Quetico funded by a variety of sources that provide benefit to the local economy. These include student researchers employed by The Quetico Foundation; sales and summer student positions funded through the Friends of Quetico at Dawson Trail; and positions at Lac La Croix funded through the Agreement of Co-existence.

There are other benefits which provincial parks and protected areas provide to local communities, to the province, and to society as a whole. The following are important benefits and help to demonstrate how the park supports our quality of life in Ontario:

- protection and contribution to ecological functions (water & soil production)
- protection of resource integrity (some of the last undisturbed areas left in the province)
- health effects from use of parks (mental, physical, spiritual benefits)
- worker productivity (healthy and happy workers tend to be more productive - a visit to a provincial park can contribute)
- educational benefits (young and old learning about the natural environment)
- scientific benefits (research in provincial parks)
- international responsibilities to protect natural settings, features and wildlife
- business location decisions (quality of life/business)
- community cohesion.

8.0 CONSTRAINT AND CAPABILITY ANALYSIS

The protection of significant natural and cultural features is the primary objective of the planning process for Quetico. By conducting an analysis of naturally occurring landform/vegetation associations, ecologists and planners can ensure that biological diversity and ecological integrity are considered during the planning process.

Constraints and capabilities are important considerations especially in the designation of park zones to allocate park land and water resources to their most appropriate use. This helps to ensure a 'best fit' of resources and values in order to achieve the provincial parks' system objectives of protection, heritage appreciation, recreation, and tourism. Some areas can be readily identified as having constraints due to their requirement for protection such as rare plant habitat or culturally significant sites. Constraint and capability analysis helps determine areas that are suitable for limited development (such as portages and campsites) as well as areas that need to be protected.

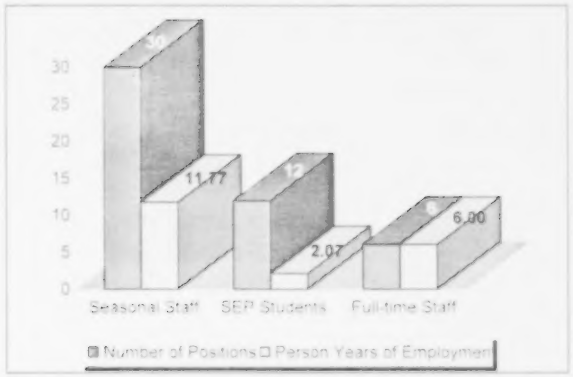
Constraints are factors that limit possibilities whereas capabilities can be described as opportunities. It is important to consider the landscape, users, and existing government policies in order to make appropriate resource management decisions. Constraints and capabilities have physical, social, cultural, and economic dimensions.

Examples of possible *capabilities* to be considered include:

- Terrain conducive to recreation
- Water accessibility for recreation
- Interconnecting waterways
- High quality sport fishing
- Landscape diversity
- Viewing opportunities (wildlife/landscape/cultural features)

Examples of possible *constraints* to be considered include:

- Access limitations
- Culturally sensitive sites
- User conflicts



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- High quality sport fishing
- Landscape diversity
- Viewing opportunities (wildlife/landscape/cultural features)

Examples of possible *constraints* to be considered include:

- Access limitations
- Culturally sensitive sites
- User conflicts

- Social limitations (perceived crowding, satisfaction with wilderness experience)
- Recently burned areas (aesthetics and unfavourable public perception)
- Sensitive vegetation
- Intensity of use
- Terrain limitations
- Water quality

8.1 Recreational Carrying Capacity

An important concept when discussing constraints and capabilities is *carrying capacity*. Carrying capacity refers to the amount of use an area can sustain without degrading the environment. Recreational carrying capacity relates to the level of use a site or area can sustain while providing high quality recreational experiences and protecting the environment. It is defined as the maximum degree of the highest type of recreational use which a wilderness area can receive consistent with its long-term preservation. Lime (1970), in examining recreational carrying capacities in the context of wilderness areas, simplified the concept substantially by identifying its two major components: firstly, the capability of the biophysical base to sustain use without deteriorating (ecological capacity); and, secondly, the tolerance of users to encounters with others (social capacity).

For an area the size of Quetico, carrying capacity is not easily determined. Traditionally, this knowledge has rested with old-time park rangers as well as the most ardent of park users. Although valuable as an input to many management decisions, this type of information is highly subjective. Consequently, in recent years, a concerted effort has been made to approach the question of carrying capacity using a science-based approach by developing a database which is both objective and comprehensive. To this end, a number of data collection projects have been initiated. Because impacts of use are greatest where users concentrate, these projects emphasize interior facility developments, particularly campsites. Specific projects include: an inventory and evaluation of the capability of Quetico's shorelines to supply canoe-camping opportunities; the identification of potential campsites; the ongoing monitoring of the condition of campsites and portages; and the estimation of user distributions on a lake-by-lake basis.

Together, the capability of Quetico's shorelines, the quality of its existing facilities and the numbers and distributions and types of park users provides a sound basis for park management. An understanding of the distribution of users provides an indication of the demands being exerted on the park's resource base as well as upon existing facilities (campsites and portages). By relating parties and visitors to campsites, on an individual lake basis, areas of overcrowding can be identified, in such instances, reference to the canoe-camping capability data will indicate if and where additional campsites could or should be developed.

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In defining the park's carrying capacity, in inventorying its facilities and estimating its use, it is important to ensure that Quetico's unique but often intangible attributes are not overlooked. It is largely upon these qualities that Quetico's reputation as one of the continent's truly outstanding canoe-camping areas is based. The following appraisal expresses in very real terms the truly outstanding potential of the park:

> *"It is not easy to describe the peculiar charm of Quetico. The fishing is good but not sensational, the scenery delightful but not spectacular, the dozens of lakes not markedly different from each other or from any lakes on Canada's Precambrian Shield. What gives Quetico its special quality is its unique blend of past and present, history and geography. Here, preserved like a gilded fly in amber, is the Canadian wilderness as the explorers and fur traders knew it centuries ago, the Canada that caught the imagination of Samuel de Champlain and the Chevalier de la Salle, the Canada that David Thompson surveyed and Alexander Mackenzie traveled."*
>
> *Blair Fraser, 1959*

8.2 Visitor Regulation Program (Quota System)

The Visitor Regulation Program (VRP) for Quetico was created in 1977 with the approval of the Quetico Provincial Park Master Plan. The VRP is based on the wilderness management philosophy of the park and the definition of wilderness. The Visitor Regulation Program plan addresses existing uses, users, numbers, impacts; it highlights park regulations specific to Quetico; and establishes cycles for the collection of travel and visitor information data.

Various components of the Visitor Regulation Program have been implemented to minimize the deterioration of both the park's resources and the quality of the visitor's experience. This has included the implementation of a quota system based on entry points and use areas (Figure 28), a reservation service to accommodate the quotas, regulations specific to the control of visitor impacts on park values, and a user education/orientation programme.

The Visitor Regulation Program quotas were based upon a defined recreational carrying capacity for the park. This capacity was derived from analysis of the recreational capabilities of both the natural resource base, the social setting for the wilderness experience and management practices to nurture wilderness settings. The capacity is presently defined as an entry quota of 68 parties (of up to 9 persons per party) per day.

The recreational carrying capacity was, to a large extent, defined by the number of campsites (data collected in the 1970s) and a predetermined occupancy rate. Actual occupancy of the campsites was determined by a travel survey done in 1975 and 1976. Actual occupancy of the campsites was last updated by a travel survey done in 1992 prior to the last review of the Visitor Regulation Program. Quetico is one of the few operating parks in the Ontario Parks system that does not have interior campsites formally designated and posted by signs; therefore standards for what should or should not be campsites have not been applied. Application of standards to campsites would significantly change the number of campsites.

[M. Mosley]

With the inception of the Visitor Regulation Program, a visitor reservation system was put in effect. The CAMIS telephone and internet reservation system was introduced in 1999 and has grown to the point where the vast majority of park visitors now use this service. Since the mid 1980s use of the wilderness has slowly increased to the point where many of the southern entry quotas were filled far in advance of the operating season. While numbers of visitors appear to have peaked and are slightly declining, southern entry quotas continue to be in high demand. Quotas on the entry points for the south side are often filled during the peak season (July/August).

In 1997, changes were made to the quota, bringing the total daily quota for the interior to 65, from 63. A new fly-in entry point was created at Cache Bay, with one permit available only to Canadian outfitters and residents, to allow northern, Canadian outfitters to better utilize southern entry points. An additional permit was also created at the Bottle River entry point at this time. No further changes were made to the quota system until 2005, when one permit was added to the Falls Chain Lakes entry point. In 2006, a trial project was created allowing fly-in entry at King Point on Basswood Lake, with a quota of two, bringing the total daily quota to 68. Recently, entry fees for the southern entry stations (Cache Bay and Prairie Portage) have been increased to reflect the higher costs of remote operations and to encourage more even distribution of use to the less busy northern access points.

[M. Mosley]

9.0 SUMMARY OF PLANNING CONSIDERATIONS (not ranked)

The following planning considerations are intended to encourage thought on issues that affect or have the potential to affect Quetico Provincial Park. Additional issues may arise during the public review of the background information. Further analysis and discussion of these will occur during the Issues and Options stage of the Management Plan Review.

9.1 Policy and Development Considerations

- The role of Quetico Provincial Park in surrounding land use development decisions and impacts on park: including activity adjacent to the east side of the park.
- To what extent should planning and policy in Quetico be consistent with that in the BWCAW?
- Possible new access points into the interior (east side, Batchewaung, King Point)
- Possible development of a new access road, parking area and portage to the shores of Batchewaung Lake.
- Future use of the former Lac La Croix entry station.
- Defining access zone boundaries
- Defining campground boundary
- Zoning adjustments to reflect new information about sensitive species, non-conforming uses, and new activities. (i.e. nature reserve zoning for provincially significant landform features and special vegetation communities that support vegetation rare to the Province of Ontario or to Quetico).
- Designation of new zones within the park (i.e. nature reserve, historical).
- Designation of access zone corridors in the northeastern portion of W1 on existing logging roads to facilitate mechanized trail grooming for cross-country skiing and/or dog sledding.
- What activities and services are appropriate for a threshold wilderness area (i.e. groomed ski trails, tent pads for winter camping)
- Phase-out of trapping in Quetico Provincial Park by non-native trappers by January 1st, 2010 and transfer of lines to Lac La Croix
- Number of flights over park each year

9.2 Ecological Considerations

- Climate change alters temperature and precipitation patterns, which has the potential to affect the frequency and intensity of severe weather events, lake water levels, forest health, and the distribution and abundance of flora and fauna. The potential for such effects has significant implications for natural resource and recreation management at the park.
- Should Quetico be managed as a static or dynamic (changing) ecosystem?
- Should park policy adapt to climate change with active or passive management options?
- Should policy at Quetico be changed to encourage and embrace long-term environmental responsibility?
- Extent to which park uses 'greener' alternatives in its operations
- Should Quetico use active or passive management to control the spread of invasive exotic species?
- Consideration of the impacts on water quality adjacent to high use campsites from the improper disposal of human waste and grey water from dishes.
- What are appropriate policies to deal with human waste in the interior?
- Monitor research efforts that increase understanding on aquatic lead contamination.

9.3 Cultural Heritage Considerations

- The relationship of Quetico Provincial Park within the Canadian Heritage River Boundary Waters-Voyageur Waterway should be refined- should there be zoning to reflect this?
- Should Quetico place a greater emphasis on its cultural heritage and archaeological resources?

9.4 Recreation Considerations

- Should there be further development of the trails system for hiking and skiing?
- Multi-use trails vs. activity-specific trails
- Increasing shoulder season (spring and fall) use of Quetico
- Should ski trails be groomed by mechanical means? (i.e. snowmachine groomed and track-set)
- What activities are appropriate in Quetico? (i.e. dogsledding, skijoring)
- Should pet owners be required to carry vaccination papers? (proof of vaccination for rabies, canine parvovirus)
- Should the interior of Quetico have designated campsites with signs?
- Should there be limits on the length of stay on a lake and/or site?
- Should Quetico actively restore degraded campsites?
- Should new facilities to accommodate new activities be developed?
- Should more campsites be created?

9.5 Visitor Regulation Considerations

- Adjustment of the quota system to reflect changes in visitor use patterns and increased shoulder season and winter use.
- Should there be a variable fee system to reflect different use patterns and season of use?
- Should Quetico continue to strive for a balance of levels of use between the north and south ends of the park?
- Should Quetico consider changes to facilities to accommodate an aging demographic of park visitors?

10.0 INVITATION TO PARTICIPATE

Your Personal Invitation

As someone with an interest in the long-term management of Quetico Provincial Park, you are invited to participate in the management planning process. Any comments, concerns or suggestions regarding this Background Information document, especially the issues that have been identified or any other aspect of park management planning are welcome. Please take the opportunity to submit your comments to the superintendent of Quetico Provincial Park.

The Ministry of Natural Resources/Ontario Parks is collecting comments and Information regarding the Quetico Management Plan under the authority of the *Provincial Parks and Conservation Reserves Act* to assist in making decisions and determining further public consultation needs. Comments and opinions will be kept on file for use during the plan review period and may be included in study documentation, which is made available for public review.

Under the *Freedom of Information and Protection of Privacy Act* (1987), personal information will remain confidential unless prior consent is obtained. However, the information may be used by the Ministry of Natural Resources/Ontario Parks to seek public input on other resource management surveys and projects. For further information regarding this Act, please contact Bill Moody in Fort Frances District at (807) 274-8632.

Please direct your comments and questions to:

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Management Plan Review
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12.0 GLOSSARY

Access Zones: serve as staging areas, a means of both providing and regulating use in areas of the park geared towards extensive recreation. Generally, development is limited to roads, visitor control structures and group campgrounds. Provision may be made for limited orientation, interpretive or educational facilities, though generally more for self-use rather than through structured personal service. Limited facilities for research and park management may be present.

Acidic: a. (rock) relatively rich in silica;
b. with a pH less than 7.0

Amphibolite: a granular metamorphic rock mainly containing hornblende and plagioclase.

Area of Concern (AOC): a geographic area within an area of operations (forest stands selected for harvest, renewal and tending operations) which is adjacent to an identified natural resource feature, land use or value that may be affected by forest management activities.

Arkose: A detrital sedimentary rock formed by cementation of individual grains of sand size and predominantly composed of quartz and feldspar. Derived from disintegration of granite.

Backcountry Recreation (non-mechanized): Includes canoe tripping, hiking or other recreational activity carried out in remote areas, accessible only by foot, or by self-propelled watercraft.

Backcountry: A term usually applied to wilderness areas where there are no permanent access roads, developments or settlements. Camping facilities are generally primitive (fire pit, tent pads, pit privy) and few other facilities exist.

Basalt: A dark, fine-grained volcanic rock, sometimes with a columnar structure. Typically composed of plagioclase with pyroxene and olivine.

Basic: a. (rock) relatively poor in silica;
b. with a pH greater than 7.0

Biodiversity or Biological Diversity: the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems

Biotite: a common rock-forming mineral of the mica group in crystalline rocks, either as an original crystal in igneous rocks or as a metamorphic product in gneisses and schists; a detrital constituent of sedimentary rocks. It is black in hand specimen, brown or green in thin section, and has perfect basal cleavage.

Boreal forest: A primarily coniferous forest with black and white spruce as characteristic species, along with balsam fir, jack pine and tamarack and a general mixture of deciduous trees, including white birch and trembling aspen.

Carrying Capacity: A resource management concept that involves a number of key aspects such as level of use, long-term maintenance and the level of environmental quality. In recreation management terms, the maximum number of individuals that a given environment can support without detrimental effects.

Chert: A member of a group of sedimentary rocks that consist primarily of microscopic silica crystals. Chert may be either organic or inorganic, but the most common forms are inorganic.

Clast: An individual grain or constituent of a rock

Clastic: Describes a rock or sediment composed mainly of fragments of preexisting rocks or minerals that have been transported some distance from their place of origin, e.g., sandstone, shale.

Commercial Tourism: A service or facility that offers resource-based recreational activities from a lodge and outpost camps.

Conglomerate: A clastic rock composed of particles more than 2 millimeters in diameter and marked by the roundness of its component grains and rock fragments.

Conservation: the wise management of the environment in a way which will maintain, restore, enhance and protect its quality and quantity for sustained benefit to humans and the environment.

Constraints and Capabilities: A constraint is as a limitation or restriction whereas a capability is the power or ability to do something. For resource planning, constraints and capabilities are often influenced by natural features (e.g., topography, climate, vegetation) or by policies or regulations that provide direction on what can, and can not be considered during planning (e.g., Provincial Parks Act, Ontario's Living Legacy Land Use Strategy)

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

COSSARO: Committee on the Status of Species at Risk in Ontario

COSEWIC and COSSARO (in brackets) Status Definitions:
Extinct (**EXT**): A wildlife species that no longer exists.
Extirpated (**EXP**): A wildlife species that no longer exists in the wild in Canada (Ontario), but exists elsewhere in the wild.
Endangered (**END**): A species that is facing imminent extirpation or extinction in Canada (Ontario).
Threatened (**THR**): A wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
Special Concern (**SC**): A wildlife species of special concern because it is particularly sensitive to human activities or natural events, but does not include and extirpated, endangered or threatened species.

Crown Land: All land held by the Province of Ontario (including lands under water) that has never been granted to any individual or group. This also includes lands that have been re-acquired by the Province.

Cultural Heritage Resource: Any resource or feature of archaeological, historical, cultural, or traditional use significance. This may include archaeological resources, built heritage or cultural heritage landscapes.

Cultural Heritage: Collective term describing examples of a society's evolution (e.g., history, anthropology, archaeology) worthy of study and preservation.

Demographics: Statistical data which illustrates the characteristics of a given population (e.g., birth rate, mortality, age, sex, income, education).

Development Zones: contain areas geared towards the support of intensive car camping and day-use activities. They constitute a relatively small portion of most parks. Development may include roads, visitor control structures, beaches, picnic areas, car campgrounds, commercial service facilities, and orientation, interpretive, educational, research and management facilities.

Diorite: a speckled, coarse-grained igneous rock essentially containing plagioclase, feldspar, and hornblende or other mafic minerals.

Disjunct: Distinctly separate; said of ranges that are discontinuous so that discrete, but potentially interbreeding, populations cannot interbreed.

Ecodistrict: An ecological landscape unit defined by a characteristic set of physiographic features, including bedrock and/or surficial geological features and topography. These physical factors result in modifications of local climate, abiotic landscape complexity and configuration, distribution of dominant surficial and soil materials, vegetation distribution and productivity. Ecodistricts are usually several thousand square kilometers in size.

Ecological function: means the natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions.

Ecological Integrity: the quality of a natural, unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species, and ecosystem diversity assured for the future.

Ecoregion: An ecoregion is a unique area of land and water, nested within one of Ontario's larger ecosystems (called ecozones) that is defined by a characteristic climate (e.g. temperature, precipitation, and humidity). This climate has a profound influence on the vegetation types, soil formation and other ecosystem processes, and associated biota that can occur within the ecoregion. Their sizes range from hundreds of thousands to tens of thousands of square kilometers.

Ecosystem: a dynamic complex of plants, animals and microorganisms and their non-living environment interacting as a functional unit. The term ecosystem can describe small scale units, such as a drop of water, as well as large scale units, such as the biosphere.

Esker: forms along the channel of a meltwater stream that flows beneath a glacier, in an ice tunnel, or between ice walls beneath the glacier. As a glacier retreats, the steep-sided esker is left behind in a pattern roughly parallel to the path of the glacier

Feldspar: an abundant rock-forming mineral occurring as colourless or pale crystals, and consisting of aluminosilicates of potassium, sodium, and calcium.

Felsic: a group of light coloured minerals including feldspar, feldspathoids, muscovite, and quartz. Contrasted with Mafic.

Forest Management Activities: Includes the

production of wood and wood products, provisions for proper environmental conditions to sustain wildlife, protection against flooding and erosion, recreation and protection and production of water supplies.

Forest Management Plan (FMP): A document containing pertinent information and prescriptions by means of which forest policy, aims, and objectives are translated into a continuity of specific treatments on a management unit for a specified period of years.

Forest Management Unit (FMU): an area of Crown forest designated under section 7 of the Crown Forest Sustainability Act (1994).

Glacialfluvial: Pertaining to the meltwater streams flowing from wasting glacier ice and especially to the deposits and landforms produced by such streams, as kame terraces and outwash plains; relating to the combined action of glaciers and streams.

Glaciolacustrine: Pertaining to, derived from, or deposited in glacial lakes; especially said of the deposits and landforms composed of suspended material brought by meltwater streams flowing into lakes bordering the glacier, such as deltas, kame deltas, and varved sediments

Gley: Soil developed under waterlogged, anaerobic conditions, resulting in reduction of iron and other elements and in gray colors and mottles.

Gneiss: a metamorphic rock with a banded or foliated structure, typically coarse-grained and containing quartz, feldspar, and mica.

Granite: a very hard, crystalline, igneous rock containing quartz, mica, and feldspar.

Granodiorite: Igneous plutonic rock, less felsic than granite, typically light in color; rough plutonic equivalent of dacite

Greywacke: Sandstone composed of poorly sorted angular clasts

Gross Output (Gross Sales): the total value of goods and services sold by businesses during the year in sustaining the projects normal year operations. Direct sales include all the value of goods and services bought for on-site operations. They include only a portion of the revenues of the project - excluded are taxes, depreciation, wages and salaries, and net profits Total sales include all the turnover of goods and services needed to sustain the project on-site and off-site.

Habitat: The place or environment where a plant or animal naturally or commonly lives and grows. Species may require different habitats for different uses throughout their lifecycle.

Interpretation: Any communication process designed to reveal meanings and relationships of cultural and natural heritage to the public, through first-hand involvement with an object, artifact, landscape, or site.

Intrusion: The action of forcing a body of igneous rock between or through existing formations, without reaching the surface.

Invasive Species: non-native species whose introduction or spread threatens the environment, the economy, and/or society, including human health.

Kame: a small hill, knob, or mound of poorly sorted sand and gravel that is deposited directly by water or by ice in crevasses, or in ice-caused indentations in the surface

Lacustrine: Pertaining to, formed in, growing in, or inhabiting lakes.

Lagg zone: Fringing wetland area around raised bogs where groundwater mixes with surface water, and where vegetation communities are transitional

Land Use Permit (LUP): A permit to occupy a specific site on Crown land for a specific purpose. It does not convey any right, title or interest in the resource being occupied. A Commercial Land Use Permit allows for commercial uses of the site to generate income. These typically consist of remote outpost camps that provide overnight accommodation for clients engaged in resource based activities such as hunting, fishing or dog sledding

Licence of Occupation (LO): A permit to occupy, similar to a LUP, but generally for longer time periods (e.g., 40 years). These are generally used in such cases as the flooding of land due to water control structures.

Mafic: refers to a group of dark-coloured minerals consisting of iron-magnesium, such as olivine or pyroxene.

Massive: refers to rocks which have no discernable structure.

Mechanized Travel: refers to All-Terrain Vehicles (including snowmobiles), motorboats, and vehicles as defined under the Provincial Parks Act, as well as other mechanical devices such as bicycles or paddleboats.

Metamorphic rock: A rock that has undergone chemical or structural changes. Heat, pressure, or a chemical reaction may cause such changes.

Metasediment: A sediment or sedimentary rock that shows evidence of having been subjected to metamorphism

Metavolcanic: partly metamorphosed volcanic rock.
Mica: a shiny silicate mineral with a layered structure, found as minute scales in granite and other rocks, or as crystals.

Microclimate: The climate of a small, local area.

Migmatite: a rock composed of two intermingled, but distinguishable components: typically a granitic rock within a metamorphic host rock.

Minerals: means metallic minerals and non-metallic minerals as herein defined, but does not include mineral aggregate resources or petroleum resources. Metallic minerals means those minerals from which metals (e.g. copper, nickel, gold) are derived. Non-metallic minerals means those minerals that are of value for intrinsic properties of the minerals themselves and not as a source of metal. They are generally synonymous with industrial minerals (e.g. asbestos, graphite, mica, salt, talc).

Mining Claim: A parcel of land (including lands under water) that has been staked and recorded in accordance with the Mining Act and its regulations. The claim conveys mineral rights only to an area of Crown land that has been staked for that purpose.

Mining Lands: includes claims and leases as defined under the Mining Act.

MNR: Ontario Ministry of Natural Resources

Monzonite: a granular igneous rock with a composition intermediate between syenite and diorite, containing roughly equal amounts of orthoclase and plagioclase.

Moraine: the name for specific landforms produced by the deposition of glacial sediments

Motorboat: a boat propelled by a motorized device (gas or electric).

Motorized Vehicle: includes an automobile, motorcycle, motor assisted bicycle unless otherwise indicated in the Highway Traffic Act, and any other vehicle propelled or driven otherwise than by muscular power, but does not include a street car, or

other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road-building machine within the meaning of this Act.

Muck: dark fine-textured well-decomposed organic material, intermixed with a high percentage of mineral matter, usually silt; it forms surface deposits in some poorly drained areas.

Native species: naturally occurring plants, animals and micro-organisms in an area or region

Natural Environment Zones: include natural landscapes which permit the minimum level of development required to support low-intensity recreational activities. Development is limited to backcountry campsites, portages, necessary signs and minimal interpretive facilities.

Natural Environment: the air, land and water or any combination or part thereof, of the Province of Ontario.

Natural Heritage: Collective term used to describe features of the natural landscape (e.g., botany, zoology, geology, geomorphology worthy of preservation.

Natural Heritage Education: Is the method by which park managers aid visitors in recognizing, using, and enjoying the educational potential of the provincial parks system. There are three levels of Natural Heritage Education service provided in the Provincial Park system: self-use, seasonal activity, major activity.

Natural Heritage Features and Areas: Features and areas such as significant: wetlands, fish habitat, woodlands, valleylands, and portions of the habitat of endangered and threatened species, wildlife habitat and areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area.

Nature Reserve Zones: protect the provincially significant earth and/or life science features within a park, and may include a protected buffer area in which a minimum of development is permitted. Such development is generally restricted to trails, necessary signs, interpretive facilities (where warranted) and temporary facilities for research and management.

NHIC: Ontario Natural Heritage Information Centre
NHIC Status Definitions:
S1: Extremely rare in Ontario. Often especially vulnerable to extirpation.
S2: Very rare in Ontario. Often susceptible to

extirpation.
S3: Rare to uncommon in Ontario. May be susceptible to large-scale disturbances.
S4: Apparently secure. Uncommon but not rare. Some cause for long-term concern due to declines or

other factors
S5: Secure. Common, widespread and abundant in Ontario

Non-conforming Use: an activity that is not normally permitted within a particular class park or zone but is considered an existing use that is contrary to policy.

Non-native species: plants, animals and micro-organisms that have been accidentally or deliberately introduced into areas beyond their normal range. Synonyms may include introduced, alien, and exotic

Olivine: Olive-green, gray-green, or brown mineral occurring widely in basalt or other basic igneous rocks. A silicate with varying proportions of magnesium, iron, or other elements.

Orogeny: the process of the formation of mountains; the process by which structures within belt0fold mountains were formed, including thrusting, folding, and faultingin the outer and higher layers, and plastic folding, metamorphism, and plutonism in the inner and deeper layers

Orthoclase: a rock-forming mineral typically occurring as white or pink crystals. It is a potassium rich alkali feldspar.

Park Classification: No individual park can be all things to all people. Park classification organizes parks into broad categories, each with particular purposes and characteristics, as well as distinctive planning and management policies. There are six classes of park within Ontario's provincial park system: Wilderness, Nature Reserve, Historic, Natural Environment, Waterway and Recreation.

Park Management Plan: A document that identifies management objectives and implementation priorities for a defined area, over a period of time (e.g., 20 years). This plan provides strategic direction for the use and management of the landscapes/ecosystems being protected. Management plans provide overall guidance in accordance with provincial policies. Management plans are based on an understanding of the natural, social, cultural and economic values of the area usually obtained through detailed inventories. The plans are prepared through a multi-stage public consultation process.

Park Zoning: The land base within a park is zoned on the basis of resource significance and recreational potential. Thus, a park's land and water resources

are allocated based upon their significance for protection or their potential for recreation and development. In this manner, park lands and waters can be allocated to their most appropriate role in each park. Depending on its classification, provincial parks may contain the following zones: Nature Reserve, Wilderness, Natural Environment, Historical, Access and Development. Not all zones are applicable in all classes of parks. Planning and management policies appropriate to each type of zone are applied consistently throughout the parks system.

Patent Land: (commonly known as 'private' land) is a grant from the crown which conveys freehold interest (through an official site boundary (G-Plan) issued by the Surveyor General of Ontario) in public lands to an individual or group.

Peat: A soft brown mass of compressed, partially decomposed vegetation that forms in a water-saturated environment and has a carbon content of 50%. Dried peat can be burned as fuel.

Physiography: Physical geography, relating to nature or natural phenomena.

Plagioclase (feldspar): a form of feldspar consisting of aluminosilicates of sodium and/or calcium. Common in igneous rocks and typically white.

Plutonic rock: an igneous rock formed at great depth; it is characteristically medium- to coarse-grained and of granitoid texture

Podzol: a group of zonal soils having an organic mat and a very thin organic-mineral layer overlying a gray, leached A2 horizon and a dark brown, illuvial B horizon enriched in iron oxide, alumina, and organic matter. It develops under coniferous or mixed forests or under heath, in a cool to temperate moist climate.

Policy: A statement of direction developed for the purpose of guiding present and future actions and decisions.

Prescribed Burn: The deliberate, planned and knowledgeable application of fire by authorized personnel and in accordance with MNR policy and guidelines to a specific land area to accomplish pre-determined forest management or other land use objectives.

Prescribed Fire: Forest fires deliberately utilized in a predetermined area in accordance with a pre-specific and approved burning prescription to achieve preset objectives.

Protected Area: Lands and waters with defined boundaries established primarily to protect natural and cultural heritage features. These areas are protected by legislation, regulation or policy to control human use, occupancy or activity. Within Ontario, these typically include provincial parks and conservation reserves.

Pyroxene: any large class of rock forming silicate minerals, typically containing calcium, magnesium, and/or iron, and occurring as prismatic crystals.

Quartz: a hard white or colourless mineral consisting of silicon dioxide, found widely in igneous, sedimentary, and metamorphic rocks. May be coloured by impurities.

Rare (Provincially Rare): species or communities ranked S1, S2 or S3 by the NHIC

Recreation: means leisure time activity undertaken in built or natural settings for purposes of physical activity, health benefits, sport participation and skill development, personal enjoyment, positive social interaction and the achievement of human potential.

Schist: A coarse-grained, strongly foliated metamorphic rock that develops from phyllite and splits easily into flat, parallel slabs.

Sedimentary rock: A rock made from the consolidation of solid fragments, as of other rocks or organic remains, or by precipitation of minerals from solution.

Sensitive: in regard to surface water features and ground water features, means areas that are particularly susceptible to impacts from activities or events including, but not limited to, water withdrawals, and additions of pollutants.

Shale: A sedimentary rock composed of detrital sediment particles less than 0.004 millimeter in diameter. Shales tend to be red, brown, black, or gray, and usually originate in relatively still waters.

Slate: A fine-grained, foliated metamorphic rock that develops from shale and tends to break into thin, flat sheets.

Species at Risk (SAR): A species of fish or wildlife that has been assessed and designated as Extinct, Extirpated, Endangered, Threatened, Vulnerable or Special Concern, by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or the Committee of the Status of Species-at-Risk in Ontario (COSSARO.)

Sustainable Forest License (SFL): Under Part III of the Crown Forest Sustainability Act, a renewable license to harvest forest resources in a management unit that requires the licensee to carry out renewal and maintenance activities necessary to provide for the sustainability of the Crown forest in the area covered by the license. This type of license may be granted for a term of up to 20 years.

Syenite: a coarse-grained igneous rock composed mainly of alkali feldspar and ferromagnesian minerals such as hornblende.

Tenure: title or disposition status that a specified area is under (e.g. land use permit, patent (private ownership) or lease)

Till: an unsorted and unstratified mixture of clay, silt, sand, gravel, cobbles, and boulders deposited directly by glacier ice.

Tonalite: a plutonic rock; quartz diorite

Topography: The natural or artificial features of a land surface.

Traditional Land/Territory: an area in which a First Nation identifies as land which they or their ancestors occupied

Traditional Use Area/Site: an area supporting current or past human use to meet the needs for food, medicine, clothing, building materials, as well as a range of social, cultural, and spiritual activities. Can be an important connection to culture as a gathering area, spiritual site, place of worship or cemetery.

Trapline: An area of land and water that is allocated to a registered trapper (and their helper(s) that is managed for the sustainability of its fur-bearing animals, according to quotas assigned by MNR.

Tuff : A general term for consolidated rocks made of material ejected from volcanic explosions.

Ultrabasic: igneous rocks having a silica content of less than 45 % by weight, most of which are also ultrabasic.

Ultramafic: igneous rocks composed mainly of mafic materials.

Utility corridors: Land alienations in the form of patents, leases or easements for the purposes of roads, railways, transmission lines, pipelines, etc.

Value Added: a measure of net output. It avoids double counting of products sold during the accounting period by including only final goods. For instance, only chairs are included, whereas the wood that goes into making them does not appear separately. It is equal to income (GPI)[Gross Provincial Income]. It may be calculated by adding wages, interest, rent and profits. Alternatively, it is equal to revenues minus the total cost of purchased inputs.

Vascular plants: Plants with woody conducting tissue which conveys sap, etc.

Volcanic (extrusive) rock: An igneous rock formed from lava that has flowed out onto the Earth's surface, characterized by rapid solidification and grains that are so small as to be barely visible to the naked eye.

Wacke: a. A' dirty' sandstone that consists of a mixed variety of angular and unsorted or poorly sorted mineral and rock fragments, and of an abundant matrix of clay and fine silt; specifically an impure sandstone containing more than 10% argillaceous matrix. The term is used for a major category of sandstone, as distinguished from arenite. b. A clastic sedimentary rock in which the grains are almost evenly distributed among the several size grades.

Watershed: Line of separation between waters flowing to different rivers, basins or seas.

Wilderness Park: A class of provincial park of substantial area where the forces of nature are permitted to function freely and where visitors travel by non-mechanized means and experience expansive solitude, challenge and personal integration with nature.

Wilderness Zones: include wilderness landscapes of appropriate size and integrity to protect natural and cultural values, and to support extensive types of backcountry recreation such as canoeing or hiking. Development is limited to backcountry campsites, portages, trails and signs necessary for route identification. Wilderness campsites are canoe-in or hike-in; established at a very low density. They offer primitive facilities (e.g. firepits and pit privies), in keeping with the character of the landscape which the zone protects.

Wilderness: wilderness areas are typically in a near-natural state, very remote and the probability of meeting other people is very low. Active management of wilderness is minimal.

Yurt: A many-sided all-season semi-permanent tent structure, mounted on a wooden deck floor off the ground.

APPENDIX I ATIKOKAN-QUETICO RECOMMENDATIONS

"On October 4th, 2004 the Atikokan Township Council asked the Minister of Natural Resources, The Honourable David Ramsay, to consider eleven recommendations. These recommendations suggested ways in which Atikokan could derive greater economic benefit from Quetico Park. Council was hopeful that benefits could be gained without negatively affecting the park.

The Town of Atikokan is facing serious social and economic challenges and in response, needs to diversify its focus to more strongly embrace tourism and outdoor recreation. The causes of the decline are many but include mine closures, forestry challenges, government cut-backs and could also potentially include the closure of the Atikokan Generating Station. The community must determine how best to take advantage of Quetico Park, Crown land, and undeveloped municipal lands." Atikokan-Quetico Recommendation Review Team Final Report, 2005

The Review Team was charged by the minister in collaboration with the Atikokan Township Council to conduct a review of the recommendations. The Team responded with suggestions that they felt will benefit Atikokan and will be beneficial or at least not unduly compromise the spirit and intent of Quetico Provincial Park. The recommendations of the Review Team included those to make the town and park more inter-connected, make the town and park more inter-connected along the whole north side of the park, enhance the park user's experience, encourage potential park users to come to the Atikokan area, and expand park-related employment.

Executive Summary---Key Ideas from the Recommendations

Access Issues

- Investigate, plan and develop park access and recreation amenities along a scenic road corridor from the Highway 11b junction to the shore of Batchewaung Lake.
  This is the primary Access Issue and the most important overall recommendation.
- Improve parking, information and washroom amenities at Beaverhouse access.
- Rehabilitate access points at Nym and Lerome Lake.
- Maintain Stanton Bay Road access to a minimum service standard.
- Seek federally legislated aircraft minimum flight ceilings and paths.
- Review all air access policies in the Management Plan Review.
- Allow discretionary air access to Mack Lake during low water periods.
- Undertake a pilot project air access to Basswood Lake/Cabin 16 area.
- Explore low cost access options at Tilly Lake and Clay Lake.

Planning Issues

- Support Township Council in the implementation of the Recreation Corridor Plan which seeks to enhance tourism opportunities on Crown Land without expanding the park boundary.
  This is the primary Planning Issue.
- Accelerate plan for Turtle River-White Otter Lake Provincial Park and Atikokan's role as an operations centre.
- Plan and Implement Improvements to Highway 11 B Junction.
- Maintain and even raise fees further on parks southern entry points.
- Invite Atikokan-Quetico Recommendation Review to continue to assist Council on an as requested basis.

Marketing Issues

- MNR, Tourism & Recreation and Atikokan to cooperate on tourism marketing initiatives.
  This is the primary Marketing Issue.
- Encourage links between Quetico and Atikokan in media.
- Continue with progress to improve reservation system.
- Continue progress on an Outfitter Certification Program.

Program Issues

- Update socio-economic impact information to provide a modern baseline and measure impacts of policy and program actions and alternatives. This is the primary Program issue.
- Establish an ecological monitoring and research program in the Atikokan/Quetico area.
- Establish an interior ranger training centre in Atikokan/ Quetico area.

APPENDIX II

GOVERNING PRINCIPLES OF THE LAC LA CROIX AGREEMENT OF CO-EXISTENCE

The formal government-to-government relationship between Ontario and the Lac La Croix First Nation is guided by the following governing principles contained within the Agreement of Co-Existence.

1) *All governments in Ontario, provincial and First Nations alike, have a shared responsibility to preserve, protect and enhance lands and natural resources for the benefit of .future generations.*

2) *The creation of Quetico Provincial Park has partially severed the people of Lac La Croix First Nation from their sacrosanct relationship with their ancestral homeland, the social health of Mind, Body and Spirit which is attributable to their relationship with the land and the economic benefits derived from the land area.*

3) *The Parties agree that in light of indignities suffered by the citizens of the First Nation, their displacement from their traditional homeland and the loss of significant economic opportunities due to the creation of Quetico Provincial Park, it is vital to foster and promote a co-operative government-to-government relationship of co-existence which recognizes the First Nation as a co decision-maker in accordance with the provisions of this Agreement in the Quetico Area while providing significant cultural, social and economic opportunities to the First Nation.*

4) *The First Nation must be an active and full participant in the .future planning, development and management of the Quetico Area in accordance with the provisions of this Agreement and share in the economic benefits derived from that Area.*

5) *The maintenance of the wilderness values of Quetico Provincial Park is of paramount importance to the people of Ontario and is consistent with sustaining the cultural and social integrity of both the First Nation and the Park.*

6) *The Parties agree that courses of action must be developed and implemented to meet the First Nation's economic needs and aspirations while consistent with the wilderness values of Quetico Provincial Park.*

7) *The Parties recognize that the lands and resources of Quetico Provincial Park have always been relied upon to .fulfil many of the economic needs of the First Nation but that Quetico Provincial Park cannot be relied upon to fulfil all of the economic development needs of the First Nation.*

8) *The Parties recognize that improved power boat and aircraft access by the First Nation, in the short term, to Quetico Provincial Park is critical for the First Nation to realize its economic development needs and viability.*

9) *The Parties agree, that in keeping with the principles outlined above, to work towards the elimination of power boat and aircraft access to Quetico Provincial Park.*

APPENDIX III

CLIMATE NORMALS FOR ATIKOKAN, ONTARIO WEATHER STATION, 1971-2000

ATIKOKAN, Ontario 48° 45' N 91° 37' W 395.30 m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature													
Daily Average (°C)	-18.1	-13.8	-6.5	2.8	10.4	14.7	17.7	16.1	10.4	4.5	-4.8	-14.2	1.6
Daily Maximum (°C)	-11.2	-6.5	0.4	10	18	21.7	24.7	22.8	16.5	9.6	0	-8.4	8.1
Daily Minimum (°C)	-24.9	-20.9	-13.4	-4.4	2.7	7.7	10.8	9.3	4.3	-0.6	-9.5	-20.1	-4.9
Extreme Maximum (°C)	7.8	11.7	17.2	28.3	34.4	32.6	35.6	35	37.2	26.1	20.2	9.2	
Extreme Minimum (°C)	-45.2	-45.6	-38.3	-28.9	-10	-3.4	-0.6	-2.8	-7.8	-17.7	-37.4	-42	
Precipitation													
Rainfall (mm)	0.3	1	11.6	27.1	66.6	103.3	97.9	97.8	89.4	58.4	12.2	2.9	568.3
Snowfall (cm)	40.7	33.8	32.8	16.2	4.2	0	0	0	2.7	11.6	42.8	35.3	220.2
Precipitation (mm)	28.8	24.7	37.4	42.9	70.8	103.3	97.9	97.8	91.6	68.4	48.2	27.9	739.6
Average Snow Depth (cm)	36	44	40	8	0	0	0	0	0	0	7	21	13
Extreme Daily Rainfall (mm)	1	5	22.1	33.6	43.4	55.4	53.6	74.2	96.6	73.9	22.3	27.4	
Extreme Daily Snowfall (cm)	36.8	17.8	23.4	41.7	14.5	0.8	0	0	27	19	45.8	23.9	
Extreme Daily Precip. (mm)	24.6	16.5	22.1	40.1	43.4	55.4	53.6	74.2	96.6	73.9	45.8	33.4	
Extreme Snow Depth (cm)	102	97	84	64	10	0	0	0	0	28	50	54	
Degree-Days													
Above 18 °C	0	0	0	0	6.4	15.7	38.3	24.3	5.2	0	0	0	89.8
Below 18 °C	1118	898	759.3	455.8	242.7	113.8	46.2	84.7	232.9	417.7	682.8	999.6	6052
Above 5 °C (growing degree days)	0	0	1	34.8	176.4	292	395.1	342.6	168.1	52.1	4.8	0	1467
Below 0 °C	560.5	391.2	217.1	32.1	0.1	0	0	0	0	11.5	168.7	442.5	1824
Days with													
Measurable Rainfall	0.61	1.1	3.2	6	12.1	15.2	14.6	14.2	14.4	11	4.2	1.1	97.7
Measurable Snowfall	15.4	12.8	11.3	4.6	1	0	0	0	0.56	4.8	13.4	15.2	79
Measurable Precipitation	13.9	11.7	12.4	9	12.5	15.2	14.6	14.2	14.7	13.9	14.2	13.8	160
Measurable Snowdepth	31	28.3	29.5	9.9	0.5	0	0	0	0	2.5	17.8	29.8	149.2
Maximum Temperature > 0 °C	1.7	5.5	17	28	31	30	31	31	30	30.1	14.2	2.8	252.4
Maximum Temperature <= 0 °C	29.3	22.8	14	2	0	0	0	0	0	0.88	15.8	28.2	112.9
Wind													
Most Frequent Direction	W	W	W	NW	NW	NW	W	S	W	S	W	W	W

Canadian Climate Normals 1971-2000, Atikokan, Ontario

http://www.climate.weatheroffice.ec.gc.ca/climate_normals/results_e.html

APPENDIX IV PARK MANAGEMENT OVERVIEW 1995 TO 2006

TABLE 4: REVIEW OF 1995 PARK POLICY IMPLEMENTATION PRIORITIES

	Objective/ Target	*Status*
	Administration	
1.	* Initiate necessary Regulation changes	Completed
2.	* Develop Implementation Strategy for the Lac La Croix Agreement of Co-Existence	Completed
3.	* Improve Interest Group liaison	Ongoing
4.	* Develop and improve opportunities for northern access	Ongoing
5.	* Extensive education effort in minimum impact camping	Ongoing- Introduction of Wilderness etiquette education at each entry station -Outfitter Certification Program
6.	* Lac La Croix and Beaverhouse Entry Stations operated and staffed by Lac La Croix First Nation by 2015	Completed
	Resource Stewardship Plans	
7.	* Fish	Completed
8.	* Fire	Completed
9.	* Research	Completed
10.	* Cultural	A Draft Plan has been completed, but not yet approved
11.	* Vegetation	A Draft Plan was completed, but not approved
12.	* Property	Not Completed
13.	* Wildlife	A Draft Plan was completed, but not approved
14.	* Air	Not Completed
15.	* Water	Not Completed
	Operations Plans	
16.	* Visitor Regulation	Ongoing
17.	* Marketing	Ongoing
18.	* Natural heritage Education	Completed
19.	* Interior Facilities	Not Completed
	Development	
20.	* Complete Dawson Trail Barrier Free Access	Ongoing
21.	* Lac La Croix Work Centre	Completed
22.	* Lac La Croix Youth Re-Discovery Camp	Developed- operating intermittently
23.	* Lac La Croix Entry Station/Interpretive Centre	Completed
24.	* Dawson Trail Roundhouse	Completed
25.	* Stanton Bay Access improvement	Completed
26.	* Highway 11 Corridor Signage improvement	Ongoing
27.	* Complete Dawson Trail redevelopment	Ongoing

TABLE 5: PARK MANAGEMENT OVERVIEW 1995-2006 – PARK DEVELOPMENTS AND INFRASTRUCTURE

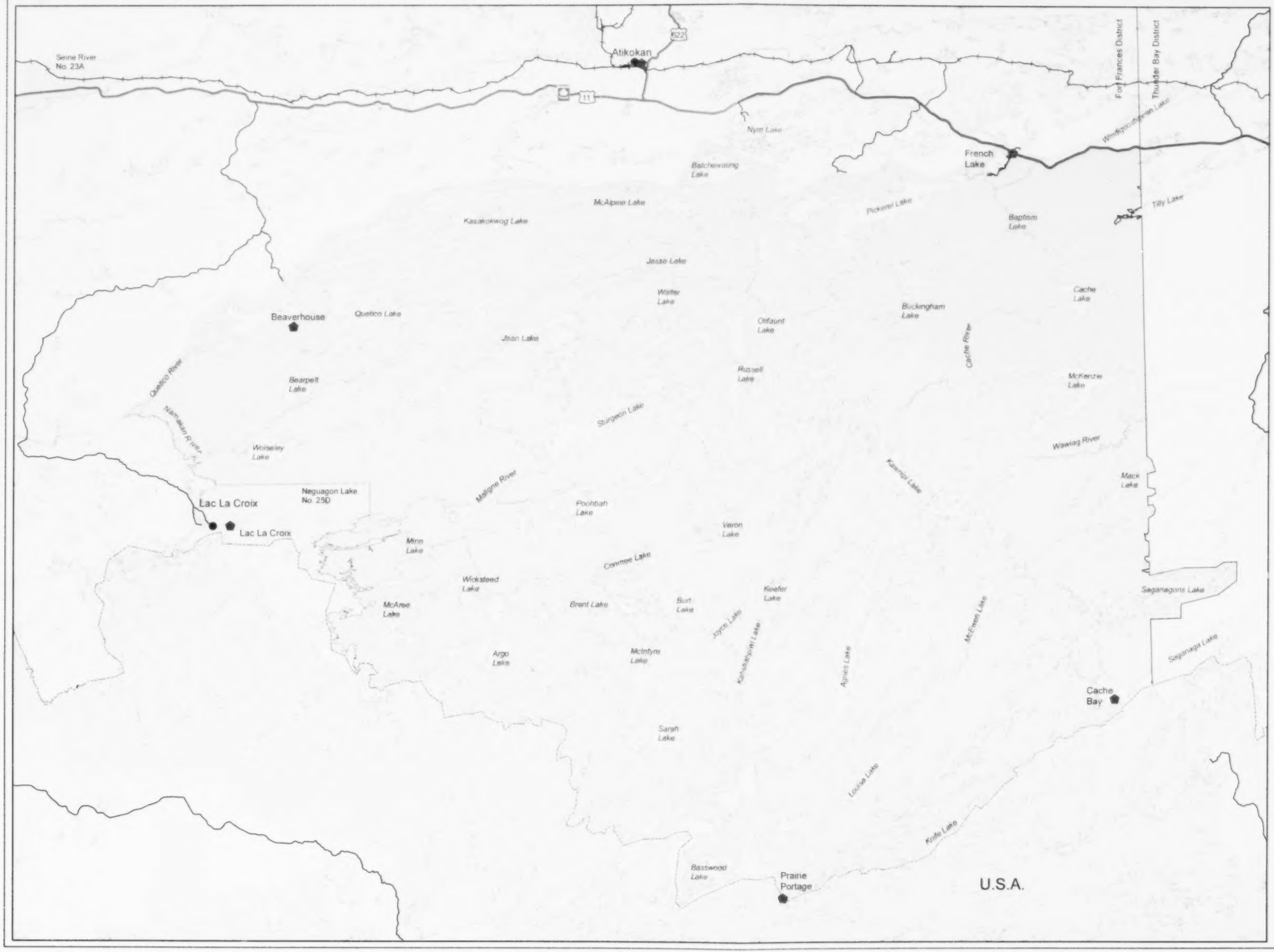
Year	*Improvement*
1996	Beaverhouse Access road improvements
1997	Interior entry station on Lac La Croix relocated to village of Lac La Croix
1997	Electricity added to 11 campsites at Chippewa Campground
1997	Stanton Bay Access road improvements
1998	Relocation of the Nym Lake Entry Station to Atikokan
1998	Relocation of Park Headquarters to Atikokan
1999	Construction of roundhouse at Dawson Trail - 'The Teaching Place'
1999	Construction of double vault privy at Nym Lake interior parking area
1999	Additional electrical sites added to Ojibway campsites
2000	Beaverhouse Access road improvements
2000	Ojibway Campground comfort station improvements
2002	Construction of log cabin Naturalist's interpretive centre- 'Ranger Hall'
2003	Composting toilets built at Prairie Portage
2003	Stanton Bay Access road improvements
2003	Installation of 2 yurts at campground for winter camping, summer use
2004	Construction of new water treatment plant, pumping stations, and water pipelines at Dawson Trail Campground
2004	Erosion control work on Nym to Batchewaung Portage
2004	Dawson Trail Entry Station upgrade
2004	Clearing and maintenance of hiking trails for winter ski trails
2005	Winterize log cabin comfort station
2005	Baptism Creek trail revitalization
2005	Log cabin campfire pit built
2005	Increase in daily quota at Falls Chain Lakes entry by 1 permit
2005	Prospector tent and privy at Baptism Creek/Camp 111 road for winter use
2005	New short-term canoe storage racks at Dawson Trail (Canoe Launch area)
2005	Dawson Trail roads repaving

2006	New camper trailer storage compound and canoe racks at Dawson Trail
2006	Removal of decaying dock at Prairie Portage
2006	Upgrade of Stanton Bay Access
2006	Replace vault privy at yurts
2006	New T-intersection at log cabin
2006	Upgrade comfort station at log cabin
2006	Prospector tent at campground for winter use
2006	Renovation of old pump house for 'Artist in Residence' program at French Lake
I/P	Renovations to staff cabin and entry station at Prairie Portage
I/P	Upgrade of Beaverhouse Access parking lot
I/P	Restoration of King Point Ranger cabin, Basswood Lake

TABLE 6: PARK MANAGEMENT OVERVIEW 1995-2006 – OTHER PARK IMPROVEMENTS

Year	*Improvement*
1997	Increase in daily quota at Bottle River entry point by 1 permit
1997	Trial fly-in access to Cache Bay, with 1 permit available only to Canadian residents and outfitters
1999	Introduction of telephone reservation system (CAMIS) for campgrounds and interior
1999	Introduction of online reservation system (CAMIS) for campgrounds
2003	Differential fees for southern entries
2004	Fire Modelling Initiative launched with Nature Conservancy
2005	Hiring of first Park Biologist to support conservation planning
2005	Outfitter Certification Program to promote conscientious practice
2006	Satellite connection at Prairie Portage to CAMIS reservation system to speed up processing reservations
2006	Point-of-sale terminals at Prairie Portage to speed up credit card transactions
2006	Trial fly-in access to King Point on Basswood Lake, with 2 permits available only to Canadian residents and outfitters
2007	Regulations for mandatory use of barbless hooks and manufactured organic bait

FIGURE 16 - PLAN AREA



ONTARIO PARKS

Quetico

Legend

- Highways
- Primary Roads
- Canadian National Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km

1:350,000

N

Ontario

Published July 2007
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This map is illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

Projection: UTM Zone 15
Datum: North American Datum 1983
Base Derived from: NRVIS (Natural Resources Values Information System)
Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

FIGURE 17 - REGIONAL CONTEXT

Quetico

Red Lake
Woodland Caribou Provincial Park
Wabauskang
Lac Seul
Wabaseemoong
Grassy Narrows
Lac Seul
105
Sioux Lookout
599
Wabakami Provincial Park
White Water
Whitesand
Armstrong
Summer Beaver
Gull Bay
Lake Nipigon
Ochlichagwebabigoning
Kenora
Dryden
72
Wauzhushk Onigum
Eagle Lake
Eagle Lake
Washagamis Bay
Wabigoon Lake
Lake of the Woods
Northwest Angle #37
Naotkamegwanning
Ignace
622
17
71
502
Turtle River-White Otter Lake Provincial Park
Onigaming
Nestor Falls
Big Island
Big Grassy
527
Nipigon
Red Rock
Lac Des Mille Lacs
Lac des Mille Lacs
Nadatchewenin
Rainy Lake
Mine Centre
Atikokan
Rainy River
Stanjikoming
Rainy River
Seine River
11
Fort Frances
Couchiching
International Falls
Thunder Bay
Sleeping Giant Provincial Park
Minnesota U.S.A.
Quetico Provincial Park
Lac La Croix
Northern Light Lake
Fort William
La Verendrye Provincial Park
Lake Superior
61
Pigeon River Provincial Park
Grand Portage
Ely
Grand Marais

Ontario
Quetico

Legend

- Community
- First Nation Community
- First Nation Reserve
- Highways
- Primary Roads
- Railway
- International Boundary
- Rivers
- Major Lakes
- Ontario Provincial Parks
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- Voyageurs National Park

0 10 20 40 km

1:1,500,000

N

Ontario

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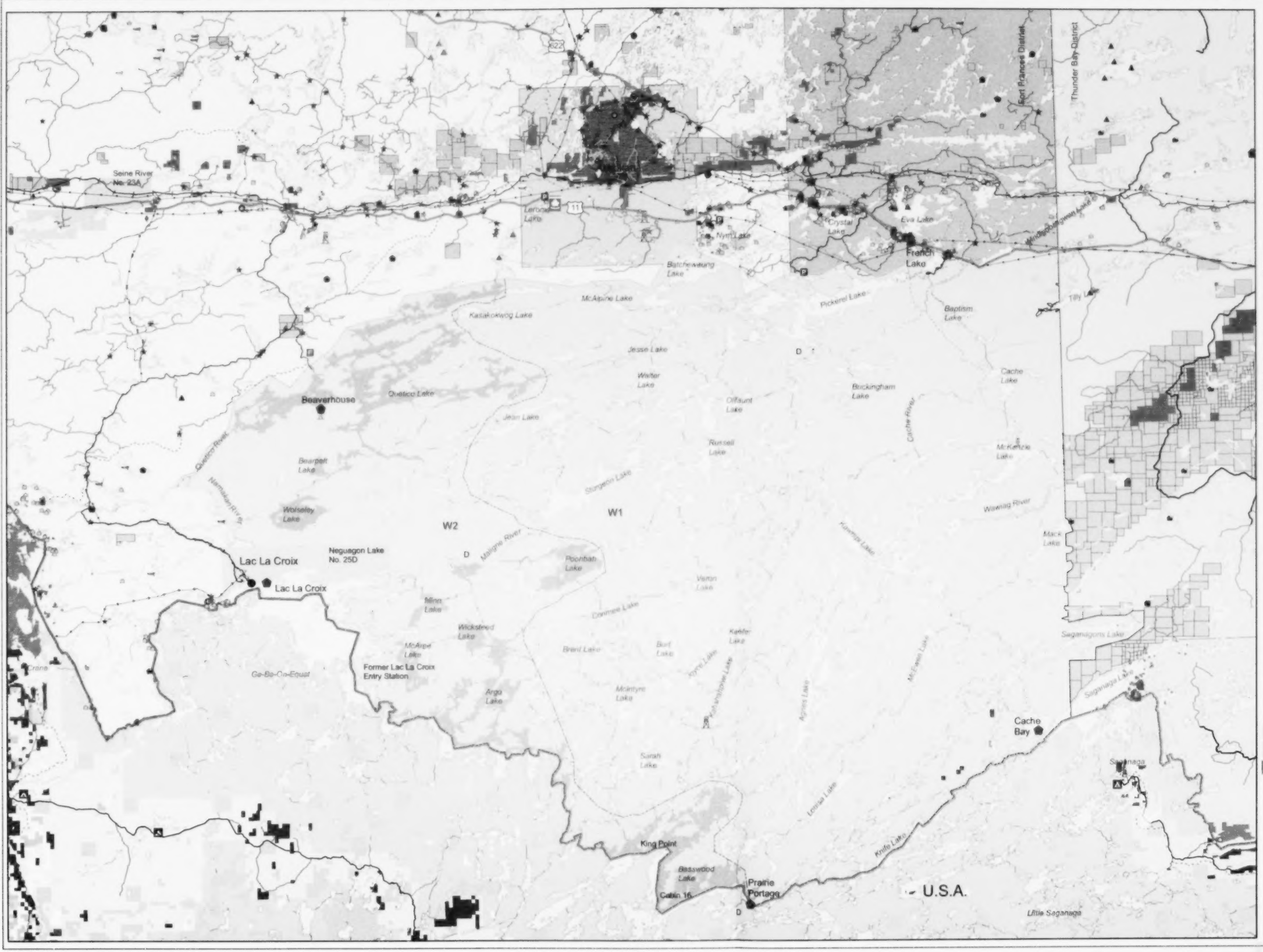
Projection: UTM Zone 15
Datum: North American Datum 1983
Base Derived from: NRVIS: Natural Resources Values Information System
Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

FIGURE 18 - LAND USE AND DEVELOPMENT



ONTARIO PARKS

Quetico

Legend

- Portage
- Ski/Hiking Trail
- Bike Trail
- Snowmobile Trail
- Wilderness Zones
- International Boundary
- Highways
- Primary Roads
- Municipal Roads
- Secondary Roads
- Canadian National Railway
- Hydro Line
- Pipeline
- Motorized Guiding Lakes
- Entry Station
- Community
- D Dam
- Ontario Hydro Plant
- Airport
- Waste Disposal
- Recreation Camp
- Youth Camp
- Cottage Site
- Lodges
- Outposts
- Campground
- Communication Tower
- Old Fire Tower
- Mill
- Ski Hill
- Boat Cache, Commercial
- Boat Cache, Private
- Boat Cache, Resource Harvest
- P Parking Area
- Aggregate Pits

Ontario Ownership

- Patent Land
- Municipality of Atikokan
- Mining Patent Land
- Mining Claims
- Mining License of Occupation
- Crown Leases

Minnesota Ownership

- Private Land
- Forestry Company Private Land
- County Land
- State of Minnesota Land

- Crossroute Forest Management Unit
- Dog River-Matawin Forest Management Unit
- Lakehead Forest Management Unit
- Sapawe Forest Management Unit

Lakes

- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Voyageurs National Park

Rivers

- First Nation Reserve Conservation Reserve
- Superior National Forest

0 2 4 8 km

1:400,000

N

Ontario

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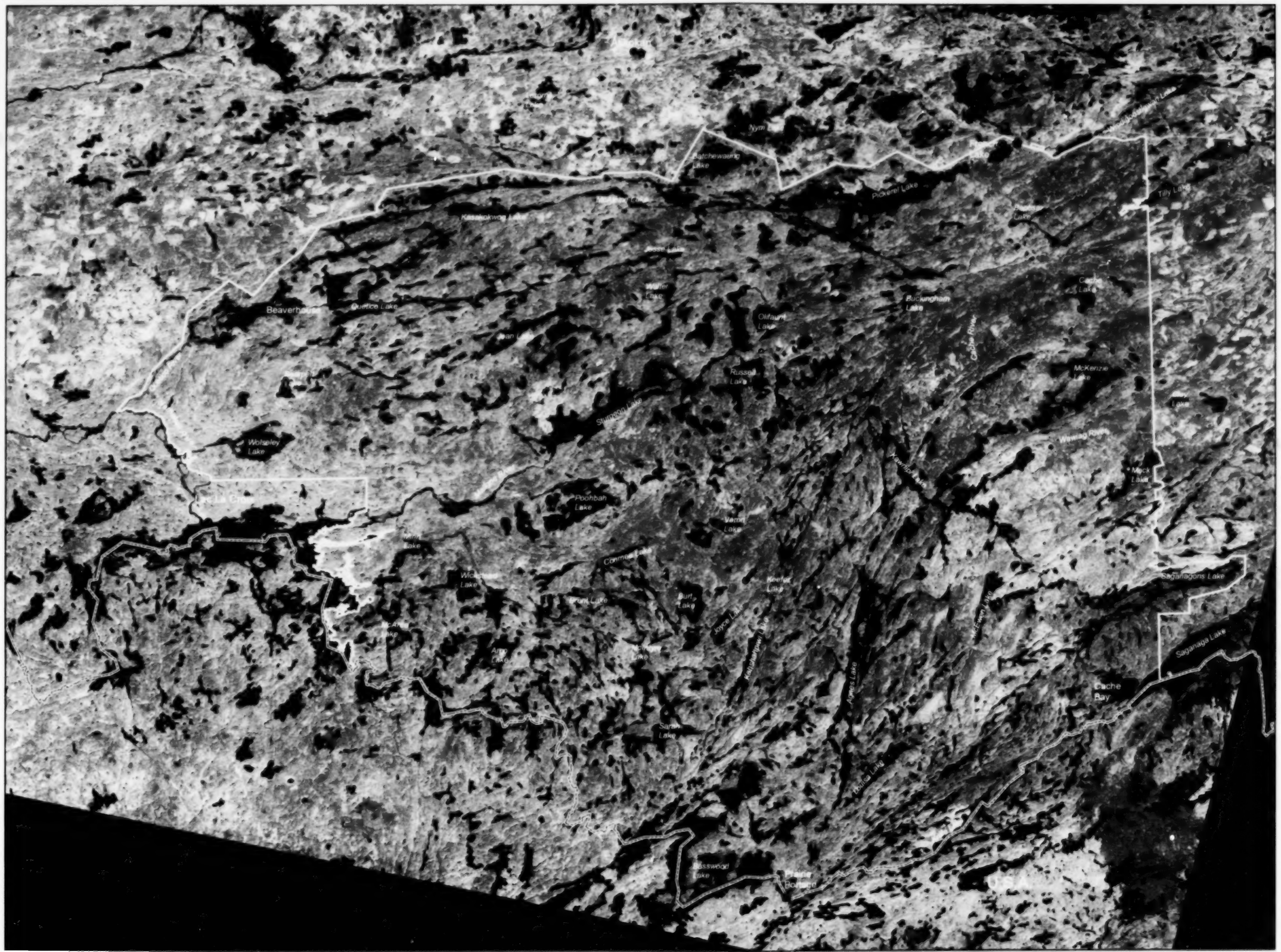
Minnesota data courtesy MN DNR
Produced by: Ontario Parks

FIGURE 18 - LAND USE AND DEVELOPMENT

FIGURE 19 - SATELLITE IMAGERY



ONTARIO PARKS

Quetico

Legend

- Entry Station
- Community
- International Boundary

Quetico Provincial Park

-Vegetation areas appear in various shades of green

-Areas with little vegetation appear in various shades of pink (this includes areas burned by fire, lowland swampy areas and logged areas outside the park)

-Water is mostly navy blue with shallower lakes a lighter blue

-The large pink area south of Cache Bay is from the Cavity Lake fire in the BWCAW that burned July -August, 2006.

0 2 4 5 km

1:350,000

N

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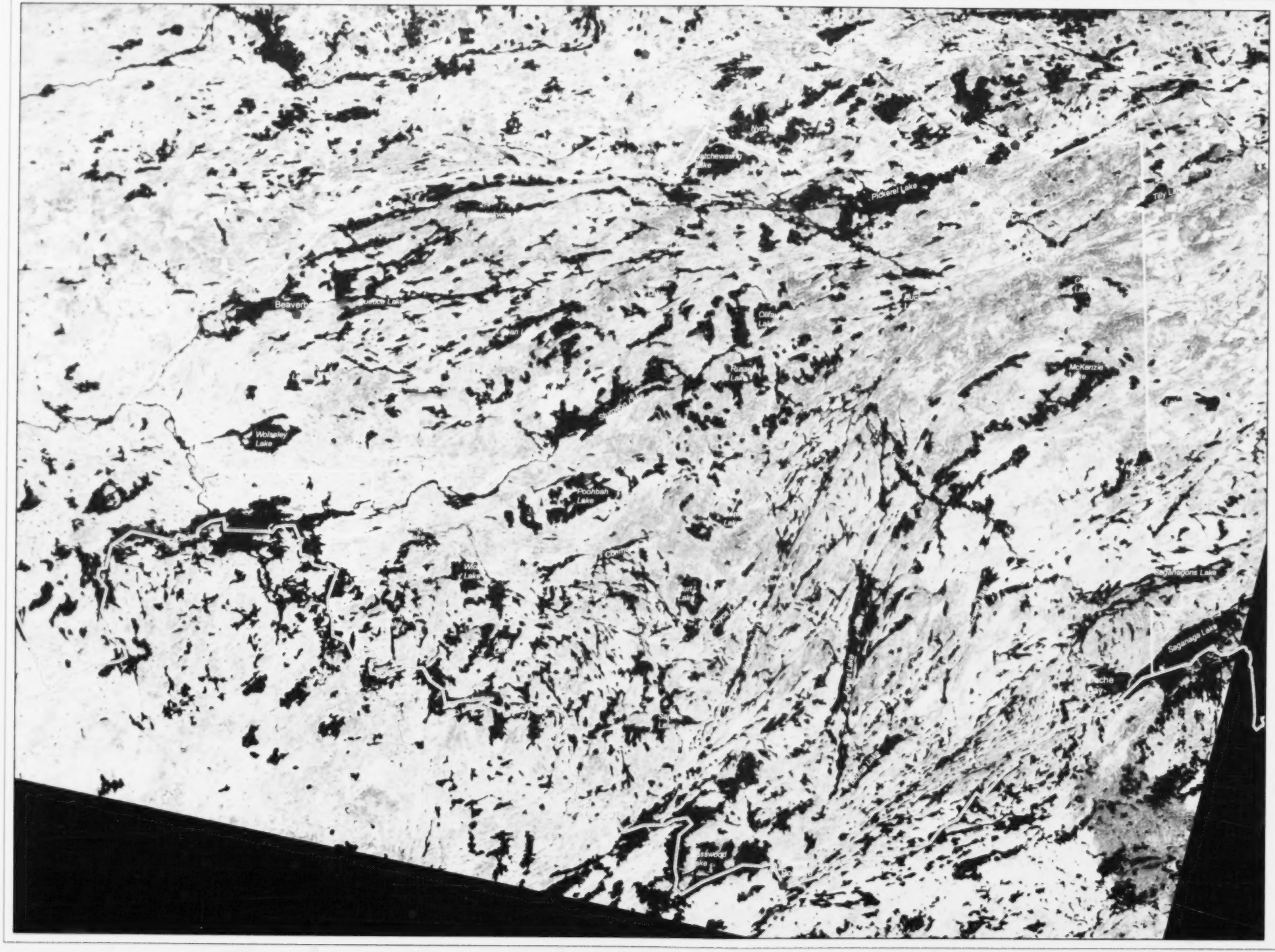
Projection: UTM Zone 15
Datum: North American Datum 1983

Landsat: NTM Sept. 13, 2006
Image composed of bands 5, 4, 3

FIGURE 19 - SATELLITE IMAGERY



Quetico

Ontario

Quetico

Legend

- Entry Station
- Community
- International Boundary

Quetico Provincial Park

-Vegetation areas appear in various shades of green

-Areas with little vegetation appear in various shades of pink (this includes areas burned by fire, lowland swampy areas and logged areas outside the park)

-Water is mostly navy blue with shallower lakes a lighter blue

-The large pink area south of Cache Bay is from the Cavity Lake fire in the BWCAW that burned July -August, 2006

N

Ontario

FIGURE 20 - TRAPLINES

Quetico

ONTARIO PARKS

Ontario

Quetico

Trapline Features

- Trapline Trail
- Trapline Boundary

Traplines Within Quetico Park

- ATxx Lac La Croix Trapline
- ATxx Trapline
- FFxx Retired Trapline

- Highways
- Primary Roads
- Canadian National Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 6 km

1:350,000

N

Ontario

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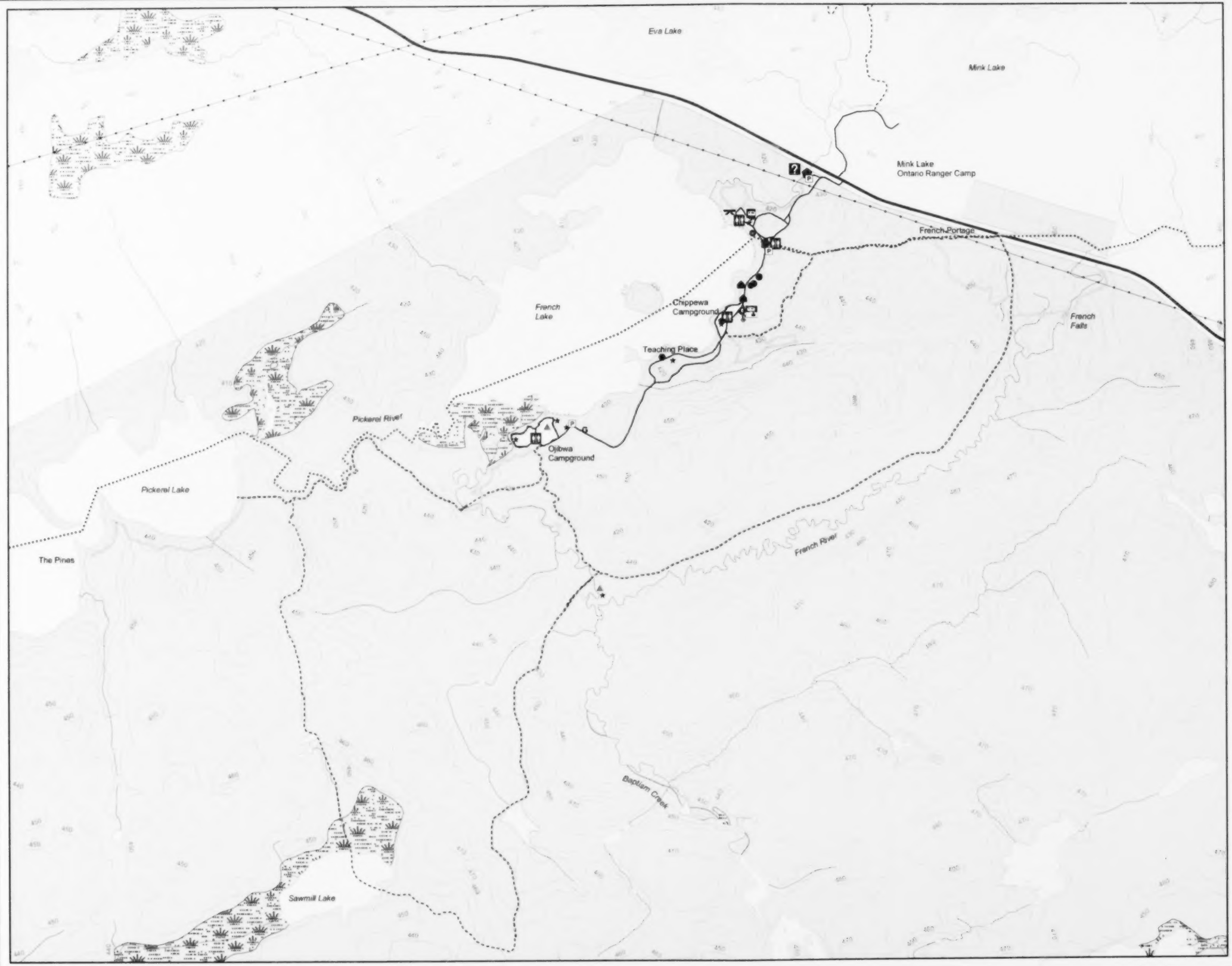
Minnesota data courtesy - MN DNR
Produced by: Ontario Parks

FIGURE 21 - FRENCH LAKE/DAWSON TRAIL CAMPGROUND AREA



ONTARIO PARKS

Quetico

Legend

- Entry Station
- Heritage Information Pavilion and Library
- Nature Centre
- Picnic Shelter
- Art Studio
- Prospector Tent
- Yurts
- Teaching Place
- Trailer Storage
- Parking
- Comfort Station
- Fish Cleaning Hut
- Garbage Disposal
- Staffhouse
- Privy
- Maintenance Buildings
- Woodshed
- Trailer Dumping & Filling Station

- Campgrounds
- Beach
- Historic travel route
- Portages
- Groomed Ski Trails
- Hiking Trails
- Hydro Line
- Highways
- Primary Roads
- Elevation Contour (metres)
- Rivers
- Lakes
- Wetlands
- Quetico Provincial Park

0 0.25 0.5 1 km

1:30,000

N

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FIGURE 21 - FRENCH LAKE/DAWSON TRAIL CAMPGROUND AREA

Quetico PARKS

Quetico

Legend

- Entry Station
- Heritage Information Pavilion and Library
- Nature Centre
- Picnic Shelter
- Art Studio
- Prospector Tent
- Yurts
- Teaching Place
- Trailer Storage
- Parking
- Comfort Station
- Fish Cleaning Hut
- Garbage Disposal
- Staffhouse
- Privy
- Maintenance Buildings
- Woodshed
- Trailer Dumping & Filling Station

- Campgrounds
- Beach
- Historic travel route
- Portages
- Groomed Ski Trails
- Hiking Trails
- Hydro Line
- Highways
- Primary Roads
- Elevation Contour (metres)
- Rivers
- Lakes
- Wetlands
- Quetico Provincial Park

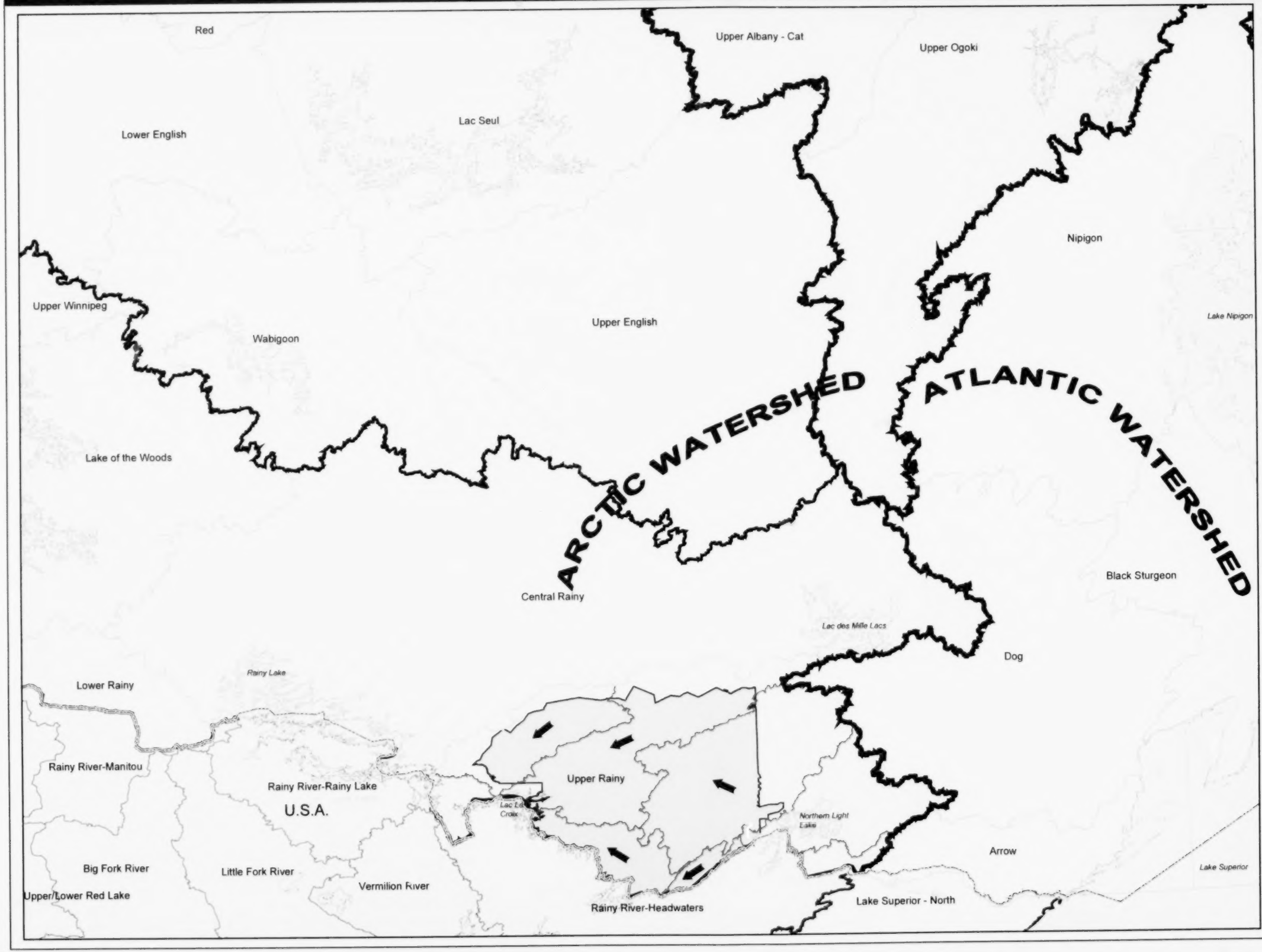
0 0.25 0.5 1 km

1:40,000

N

Ontario

FIGURE 22 - WATERSHEDS



ONTARIO PARKS

Quetico

Watersheds

Ontario

- Primary
- Secondary
- Tertiary
- Upper Rainy Quaternary
- Direction of Water Flow

Minnesota

- Province
- Major

- International Boundary
- Major Lakes
- Quetico Provincial Park

N

0 5 10 20 km

1:1,250,000

Ontario

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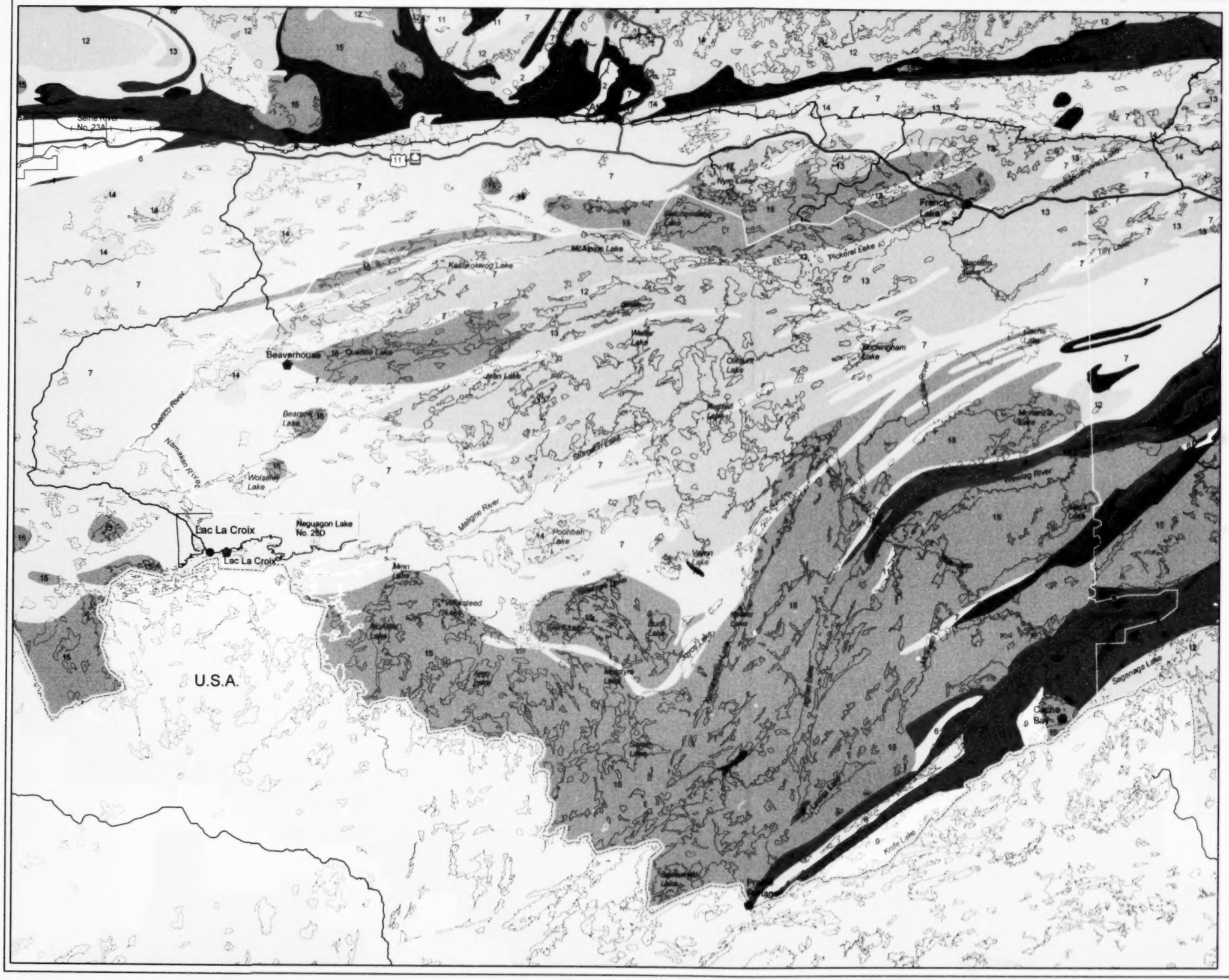
Projection: UTM Zone 15
Datum: North American Datum 1983
Base Derived from: NRVIS (Natural Resources Values Information System)
Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

FIGURE 23 - BEDROCK GEOLOGY



ONTARIO PARKS

Quetico

Bedrock Geology

- Metasedimentary rocks and mafic to ultramafic metavolcaic rocks
- Mafic metavolcanic and metasedimentary rocks
- Mafic to ultramafic metavolcanic rocks
- Mafic to intermediate metavolcanic rocks
- 6, 2 Felsic to intermediate metavolcanic rocks
- 7 Metasedimentary rocks
- 9 Coarse clastic metasedimentary rocks
- Mafic and ultramafic rocks
- 11 Gneissic tonalite suite
- 12 Foliated tonalite suite
- 13 Muscovite - bearing granitic rocks
- 14 Diorite - monzonite - granodiorite suite
- 15 Massive granodiorite to granite

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes

- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km
1:375,000

N

Ontario

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Minnesota data courtesy MN DNR
Produced by: Ontario Parks

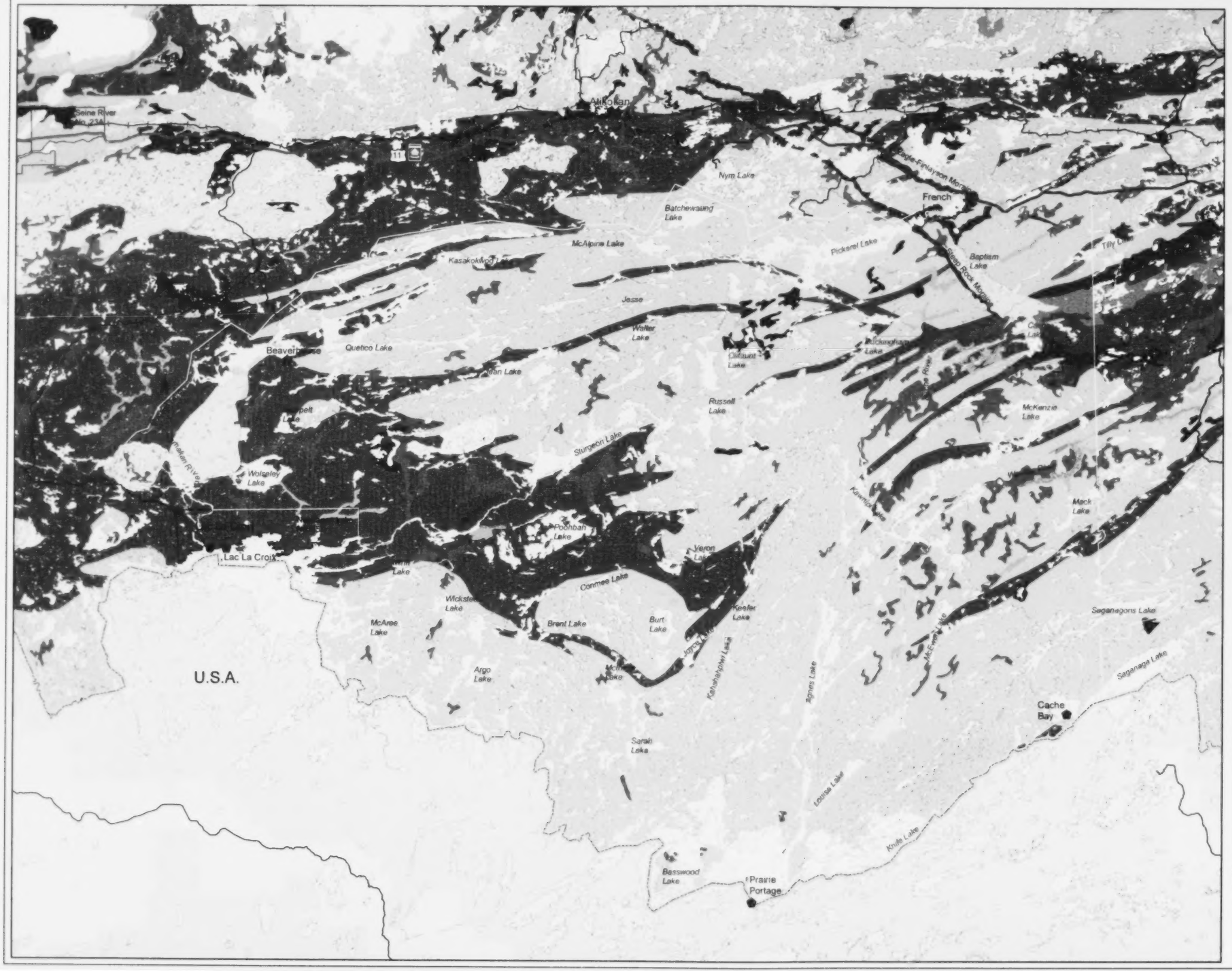
FIGURE 23 - BEDROCK GEOLOGY

Bedrock Geology

- 1 Metasedimentary rocks and mafic to ultramafic metavolcanic rocks
- 3 Mafic metavolcanic and metasedimentary rocks
- 4 Mafic to ultramafic metavolcanic rocks
- 5 Mafic to intermediate metavolcanic rocks
- 7 Metasedimentary rocks
- Coarse clastic metasedimentary rocks
- 10 Mafic and ultramafic rocks
- 11 Gneissic tonalite suite
- 12 Foliated tonalite suite
- 13 Muscovite - bearing granitic rocks
- 14 Biotite - hornblende - granodiorite suite
- 15 Massive granodiorite to granite

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- Four Nations Reserve

FIGURE 24 - SURFICIAL GEOLOGY



ONTARIO PARKS

Quetico

Surficial Geology

- Alluvial & Fluvial Deposits
- Coarse Ground Moraine
- Coarse Lacustrine & Glaciolacustrine
- Colluvium (Coarse)
- End Moraine
- Fine Ground Moraine
- Fine Lacustrine & Glaciolacustrine
- Glaciofluvial Delta
- Glaciofluvial Esker-Kettle Terrain
- Glaciofluvial Outwash
- Organic Deposits
- Precambrian Basic to Intermediate Bedrock*
- Precambrian Intermediate to Acidic Bedrock*
- No Data

* covered by <1m. of till

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km

1:375,000

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Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

Quetico

Surficial Geology

- Alluvial & Fluvial Deposits
- Coarse Ground Moraine
- Coarse Lacustrine & Glaciolacustrine
- Colluvium (Coarse)
- End Moraine
- Fine Ground Moraine
- Fine Lacustrine & Glaciolacustrine
- Glaciofluvial Delta
- Glaciofluvial Esker-Kettle Terrain
- Glaciofluvial Outwash
- Organic Deposits
- Precambrian Basic to Intermediate Bedrock*
- Precambrian Intermediate to Acidic Bedrock*
- No Data

* covered by <1m of till

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

N

0 2 4 8 km

1:375,000

Ontario

FIGURE 25 - FOREST COMMUNITIES

ONTARIO PARKS

Quetico

Forest Communities

- Bedrock
- Burns
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Open Bog
- Open Fen
- Regenerating Depletion
- Sparse Forest
- Treed Bog
- Treed Fen
- No Data

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km

1:375,000

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Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

FIGURE 25 - FOREST COMMUNITIES

Quetico

Forest Communities

- Bedrock
- Burns
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Open Bog
- Open Fen
- Regenerating Depletion
- Sparse Forest
- Treed Bog
- Treed Fen
- No Data

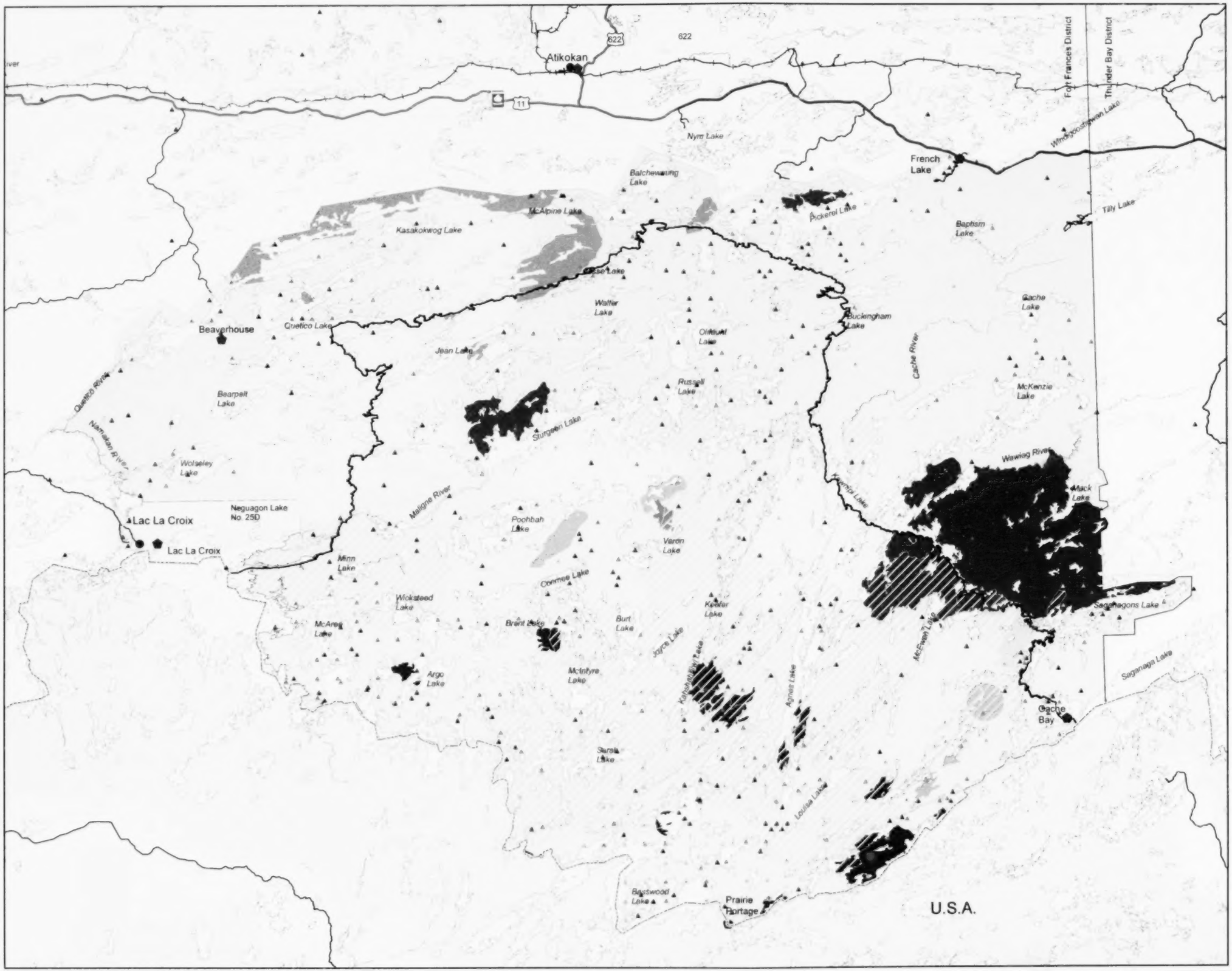
- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes

- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

N

Ontario

FIGURE 26 - FIRE HISTORY



ONTARIO PARKS

Quetico

Fire History

Prescribed Fire Compartment

Woods and Day Fire History 1770-1933 (not completed for entire park)

Large Fires	Point Fires
2000 - 2006	▲ 2000-2005
1990 - 1999	▲ 1990-1999
1980 - 1989	▲ 1980-1989
1970 - 1979	▲ 1970-1979
1960 - 1969	1960-1969
1950 - 1959	
1940 - 1949	
1930 - 1939	
1920 - 1929	

- Highways
- Primary Roads
- CN Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km

1:350,000

N

Ontario

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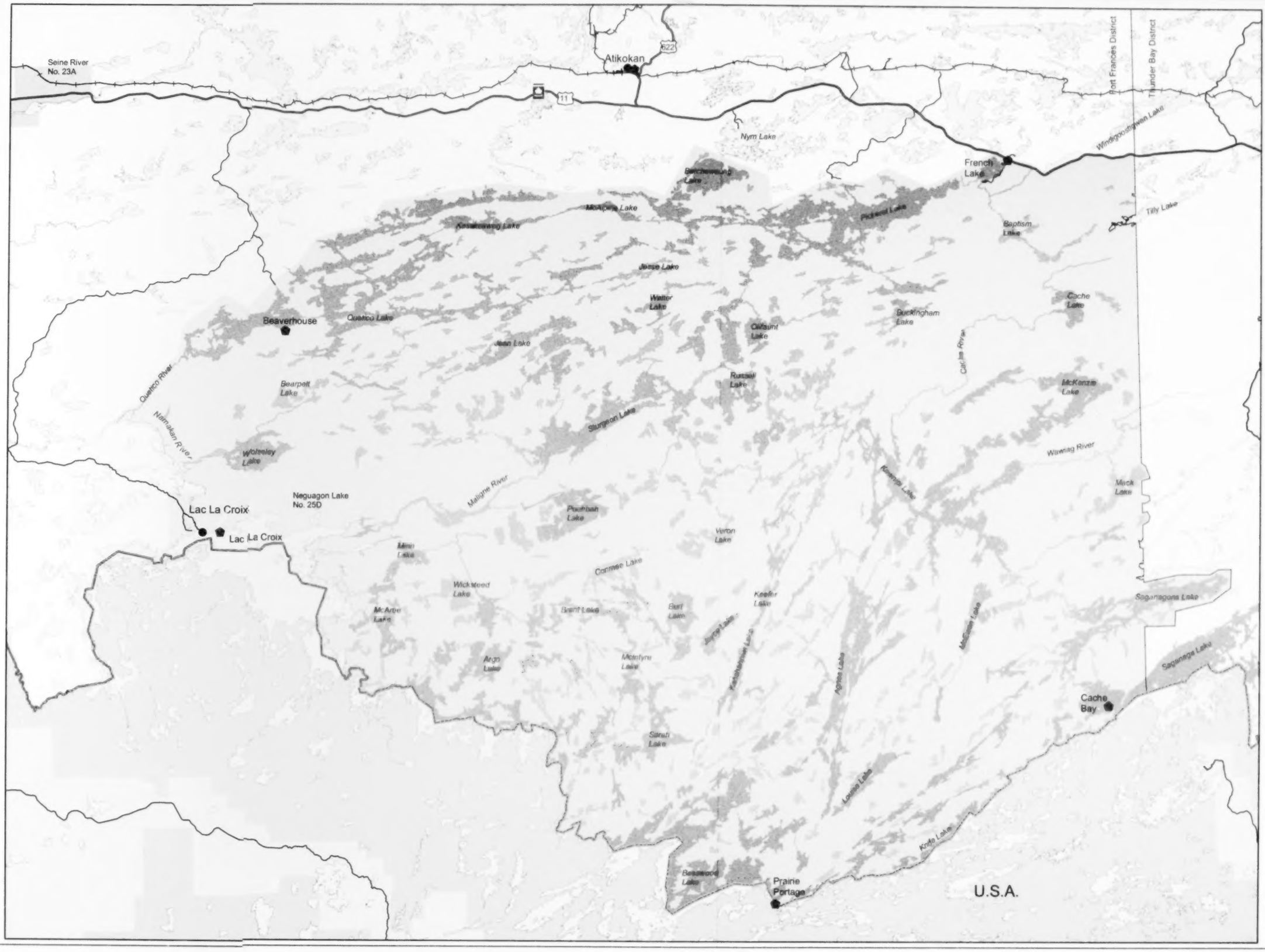
Minnesota data courtesy: MN DNR
Produced by: Ontario Parks

FIGURE 27 - FISHERIES VALUES



ONTARIO PARKS

Quetico

Quetico Lake Type

- Warmwater Lake
- Coldwater Lake

- Highways
- Primary Roads
- Canadian National Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

0 2 4 8 km

1:350,000

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Mnemonic data courtesy - MNR (NW)
Produced by: Ontario Parks

FIGURE 27 - FISHERIES VALUES

ONTARIO PARKS

Quetico

Ontario

Quetico

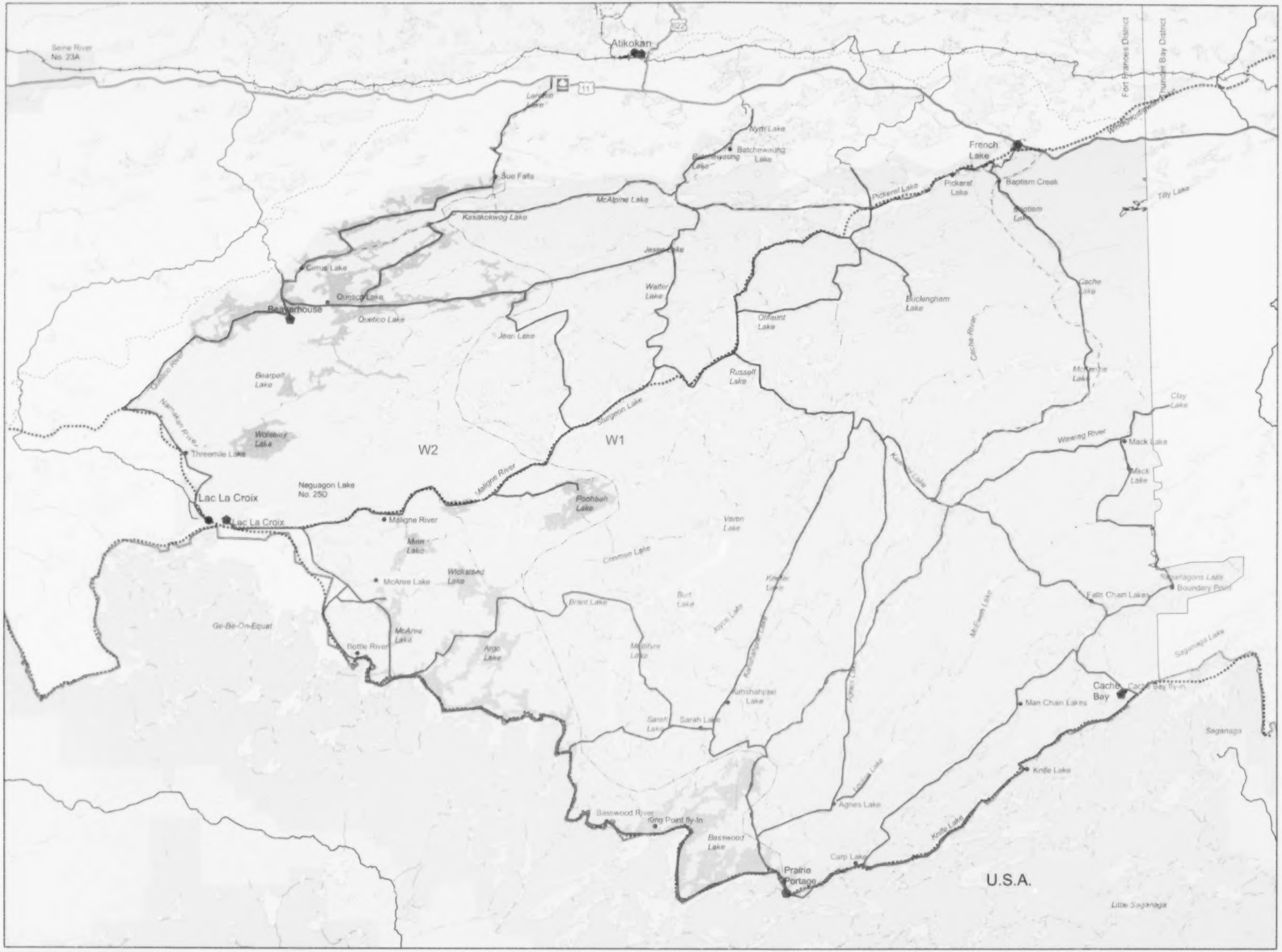
Quetico Lake Type

- Warmwater Lake
- Coldwater Lake

- Highways
- Primary Roads
- Canadian National Railway
- Entry Station
- Community
- International Boundary
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

Ontario

FIGURE 28 - RECREATION VALUES



ONTARIO PARKS

Quetico

Legend

- Portages
- Ski /Hiking Trails
- Historic Travel Routes
- Major Winter Travel Routes
- Major Canoe Routes
- Mountain Bike Trails*
- Snowmobile Trails*
- Entry Points
- Entry Station
- Motorized Guiding Lakes
- Wilderness Zones
- International Boundary
- Highways
- Primary Roads
- Canadian National Railway
- Community
- Rivers
- Lakes
- Quetico Provincial Park
- Boundary Waters Canoe Area Wilderness
- Superior National Forest
- First Nation Reserve

* outside of Quetico Park

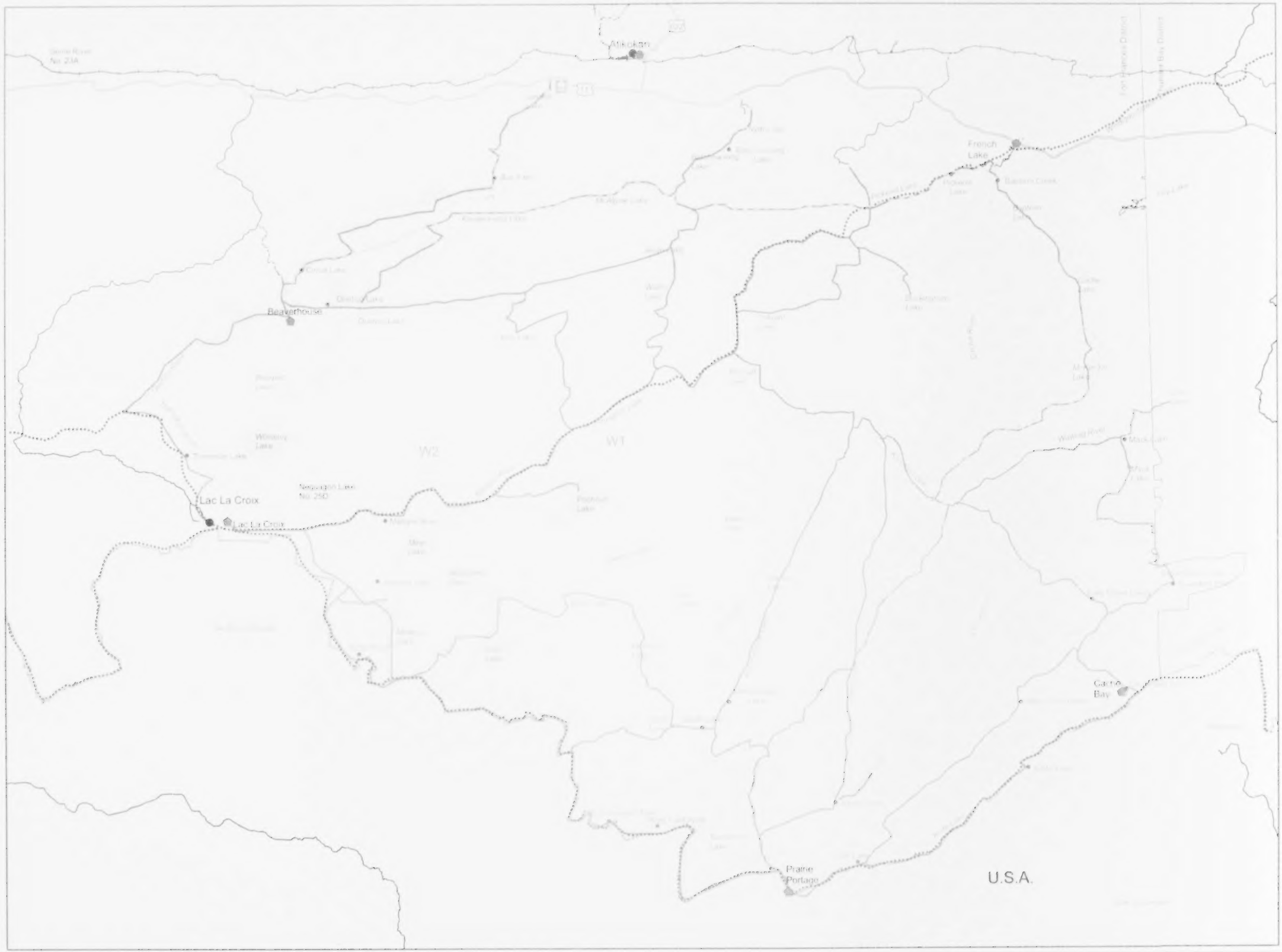
0 2 4 8 km

1:350,000

N

Ontario

FIGURE 28 - RECREATION VALUES



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